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May 11, 1992 • 95

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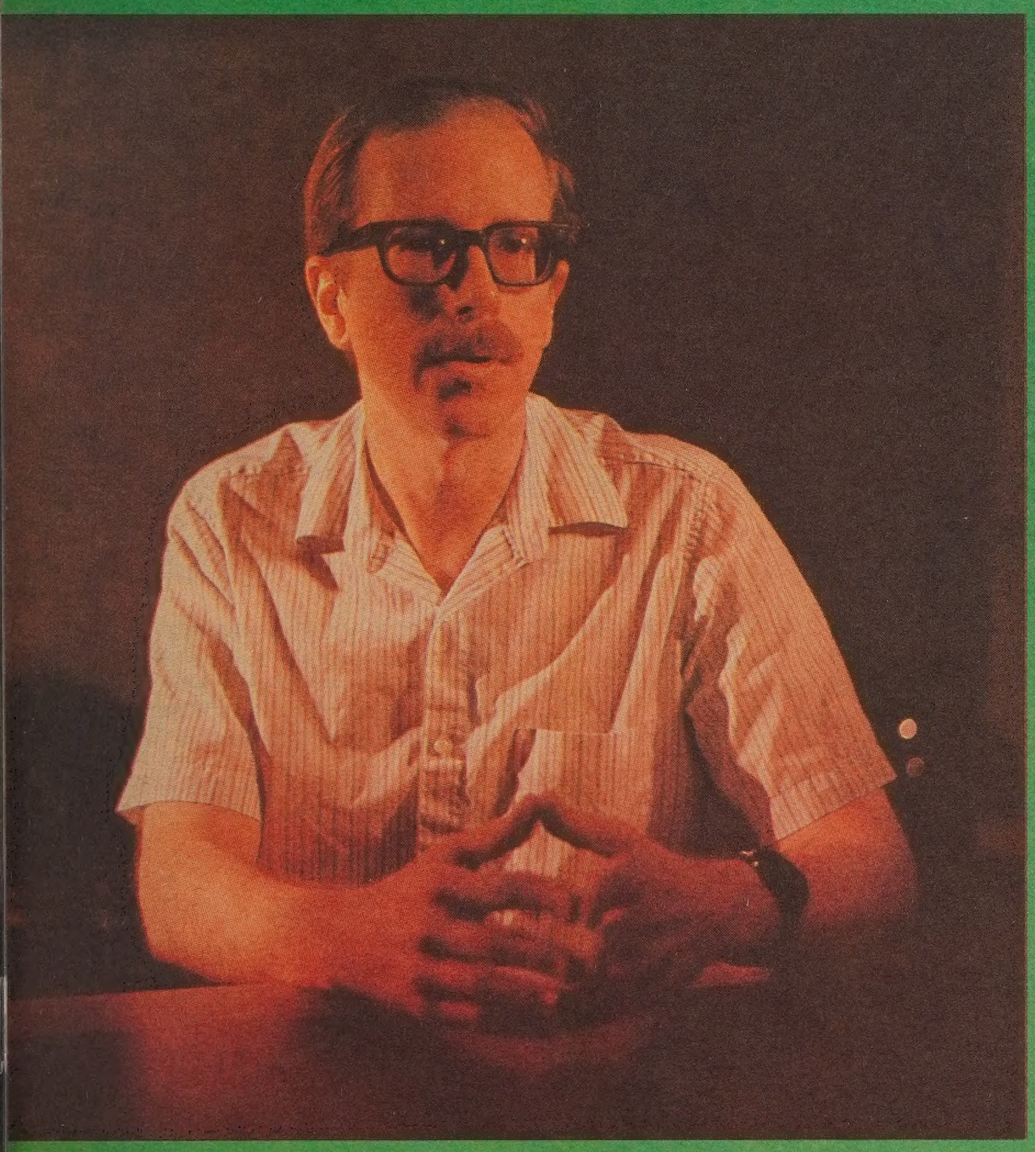

Autodesk: The Next Generation

An Interview With Founder John Walker

"CAD is about building models of real-world objects inside the computer. I believe that in the fullness of time, every object in the world, manufactured or not, will be modeled inside a computer. That is a very, very big market. This is *everything*." Story starts on page 58.

Polaroid's New Digitizer

"Long known for 'instant' color photos, Polaroid has ntroduced an equally quick urnaround from paper print to high-resolution digital image on the screen of a Macintosh or PC." Story starts on page 198.

Windows 3.1: Upgrading Without Tears

"In this issue, you'll notice that the reviews for Windows 3.1 blow hot and cold. So 3.1 prints faster and has a better file manager—it's also incompatible with some 3.0 apps and may blow the installation procedure. All of this is true." Story starts on page 116.

The Complete Communicator

"On a single card, you get a 2400 baud modem, a 9600 baud fax board, a full- or half-page scanner port, and a complete voice mail system. A single card, a single memory address, a single interrupt." See page 130.

MicroMarketplace: Special Advertising Section For Bay Area Computer Buyers Starts On Page 70

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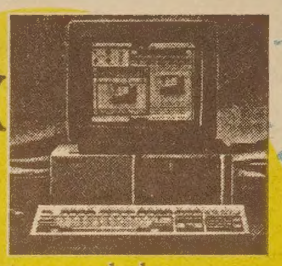

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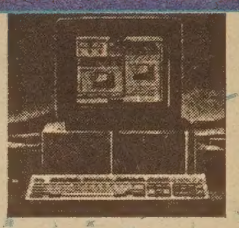

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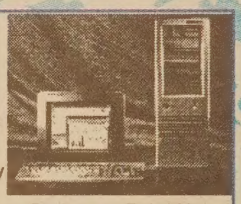

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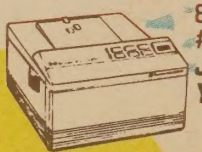

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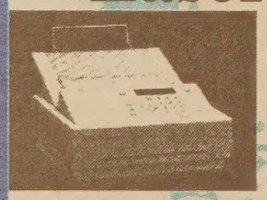

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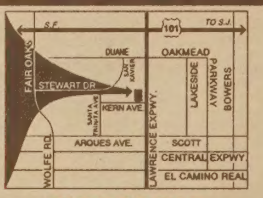

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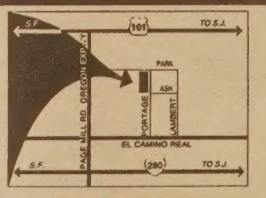

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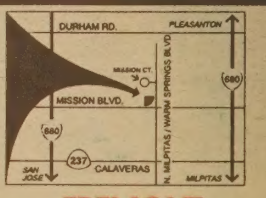

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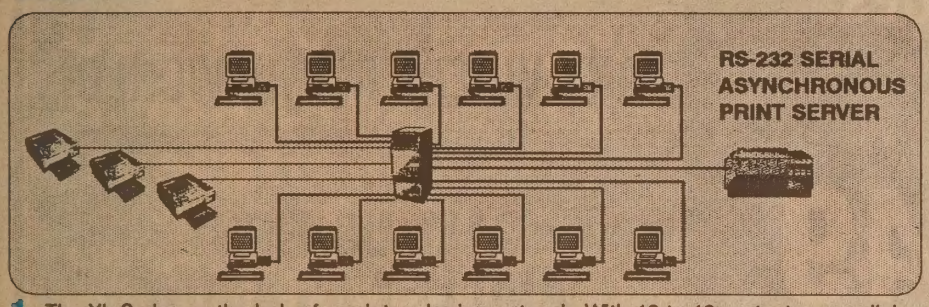

1. The XL-Series as the hub of a printer sharing network. With 10 to 18 ports, two parallel connectors and RJ12 twisted pair connectors for the remainder, this configuration allows you to create a stand-alone network and add stations as required.

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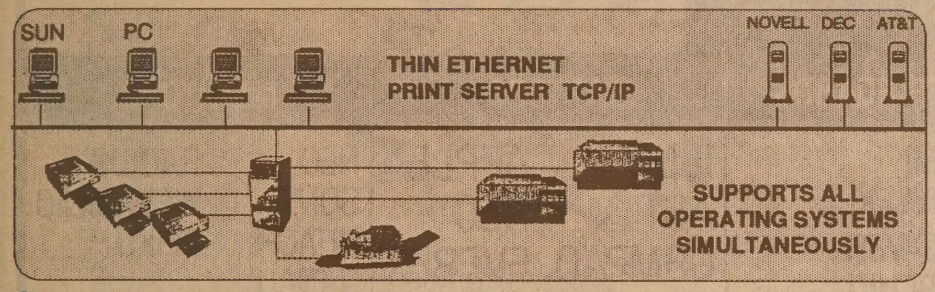

2. The XL-Series as an Ethernet TCP/IP print server. Connect the unit as one of the nodes on your network and link-up to any one of 10 to 18 printers.

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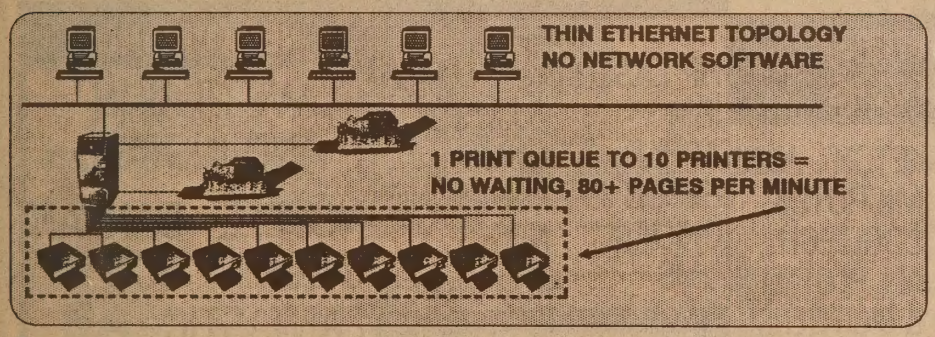

3. The XL-Series as a print server or peripheral sharing hub - using thin Etherent cables, but without network software. Ten printers in a class yield 80 pages per minute output - no queues and no waiting.

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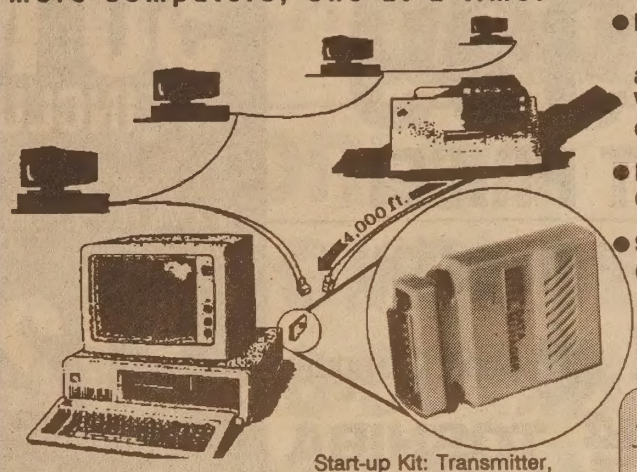

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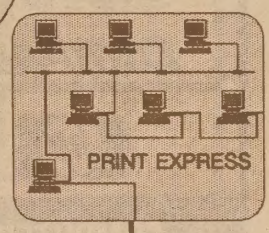

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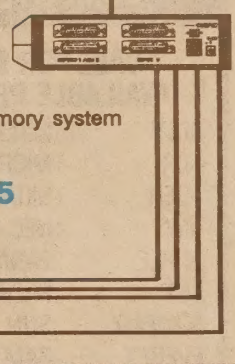

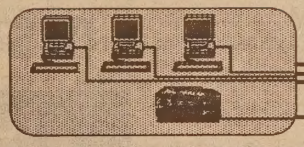

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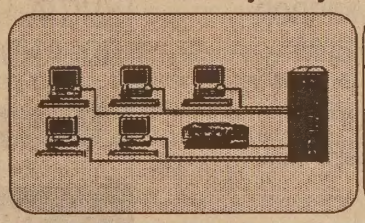

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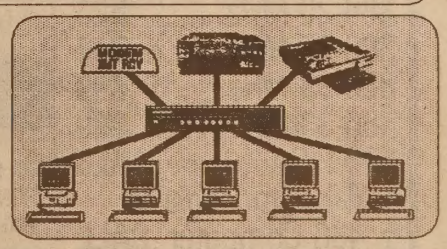

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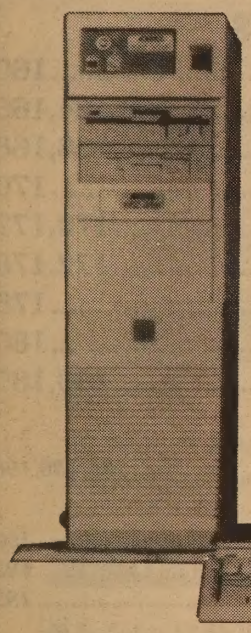

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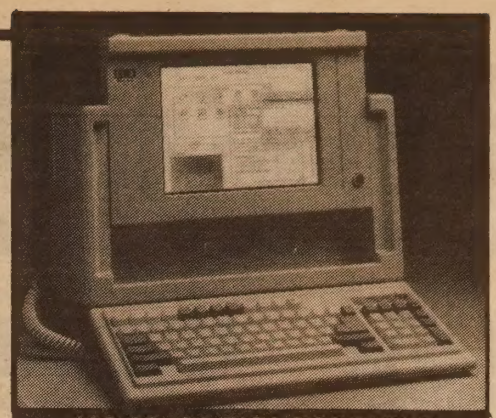

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MICROTIMES™

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A NOTE FROM THE EDITORS

We're very proud to be bringing you this month's cover story, an in-depth interview with John Walker of Autodesk. He doesn't do them too often, and, as readers of *The Autodesk File* or the now-famous memo "Autodesk: The Final Days" can attest, he has some valuable and far-reaching insight to offer.

Visionaries, self-appointed or otherwise, are relatively common in this business. Visionaries with a firm grounding in common sense and customer service are a lot more rare. Walker is that and more. We hope you enjoy reading this interview as much as we enjoyed putting it together.

—ME

COVER STORY

Autodesk: The Next Generation *By Mary Eisenhart* 58
Cover and contents photos: Michael Jay
Autodesk cofounder, former president and chairman, and current programmer John Walker talks about future technologies, their implications for his company, and the world they'll help create.

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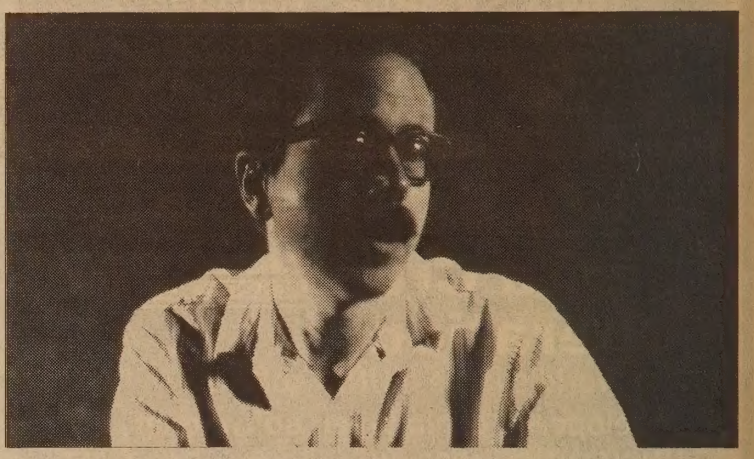

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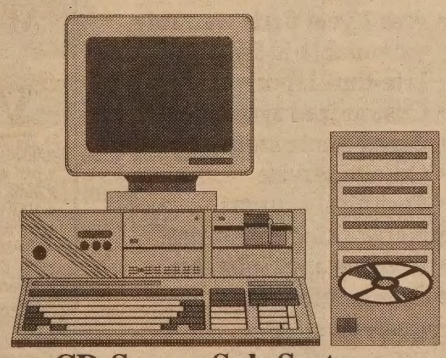

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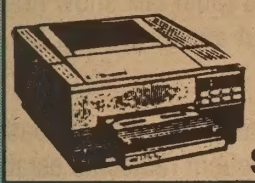

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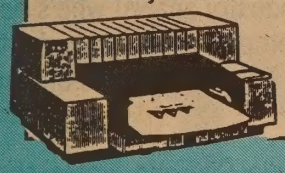

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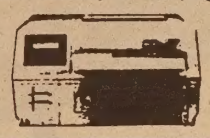

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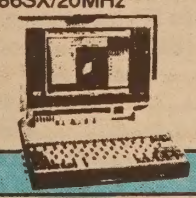

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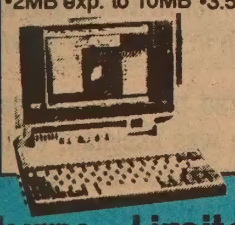

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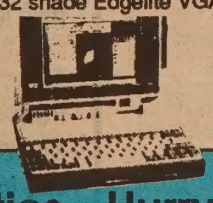

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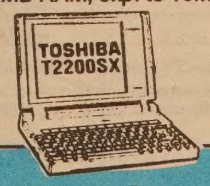

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CONTRIBUTORS

As we celebrate our eighth anniversary of publication this month, we take this occasion to welcome Kimberly Guzman to our pages. Kim contributed the feature on *Silicon Valley Report*, which appears on page 158.

Kim's a free-lance writer and student. She's also the daughter of Terrylynn Pearson, who, eight years ago, was doing PR for Electronic Arts and arranged our first cover interview for us despite our stunning ignorance at the time. We've stayed in touch over the years, and we're delighted to welcome Kim to the extended *MicroTimes* family.

—ME

Anna Couey (*couey@well.sf.ca.us*) is a writer and artist. She is network coordinator for Arts Wire, an arts news and advocacy computer networking project. She specializes in cultural applications of new communications technologies.

Kathleen Creighton is a longtime observer of public online services. She can be reached at *casey@well.sf.ca.us*.

John C. Dvorak is a columnist, book author, software publisher and radio talk show host. He interviews the devil but avoids signing the contract.

Bennett Falk works in tech support at Sybase. He has been known to frequent radicchio establishments in Emeryville.

Peter John Harrison is a data communications and connectivity specialist based in San Francisco.

Paul Hoffman is an industry analyst who's been writing about microcomputer technology for ten years, and the author of several books on computer-related topics.

Ed Kahn lives in Studio City and writes about laptops and other PC technology.

Matthew Leeds works at Brøderbund Software, and is also a writer and photographer. He writes about Amiga- and Macintosh-related products and issues.

Woody Liswood has been writing about microcomputer hardware and software since 1980. He has also published a book on micro-based Human Resource Information Systems.

Mike Markowitz has written about games and other interesting subjects for us since our first issue. He works in the computer lab of a major Southern California university, where the questions of new users inspired his "Your First Computer" columns.

David Morgenstern is a BMUG volunteer and works in the library at San Francisco State.

Tony Reveaux is a San Francisco-based consultant the editor of *Computer Publicity News*. He's also a contributing editor for *Artweek*, and writes the "MediaScan" column in *Film/Tape World*.

Tony Rocco, remembered by longtime readers from the days when he was assistant editor at *MicroTimes*, is now a free-lance technical writer and journalist based in the Bay Area.

Jim Warren, a man of many accomplishments in the computer industry over the years, recently chaired the First Conference on Computers, Freedom & Privacy. He also serves on the board of directors of Autodesk.

LAN columnist Wayne A. Yacco is a consultant and writes for many computer publications on a variety of subjects. He lives in Burbank.

Hassle-Free Printer Sharing

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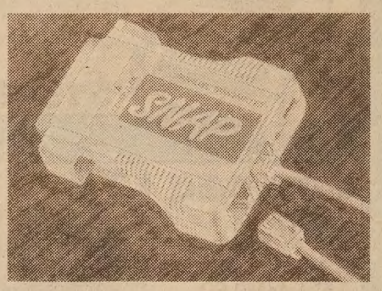

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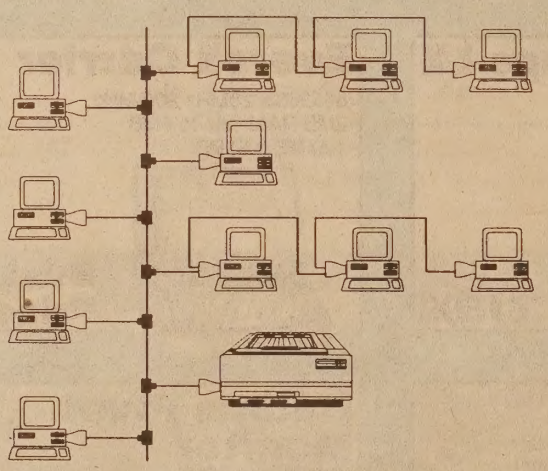

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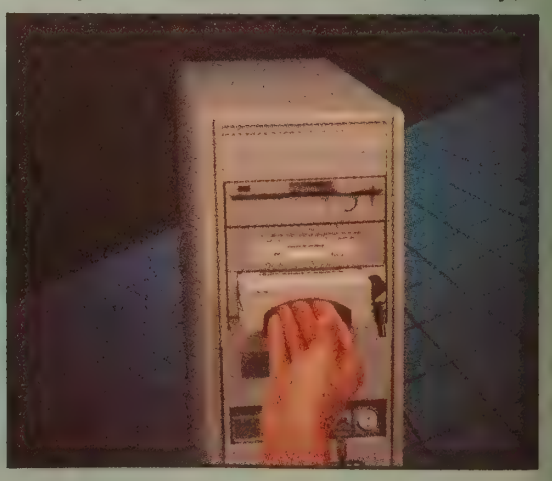

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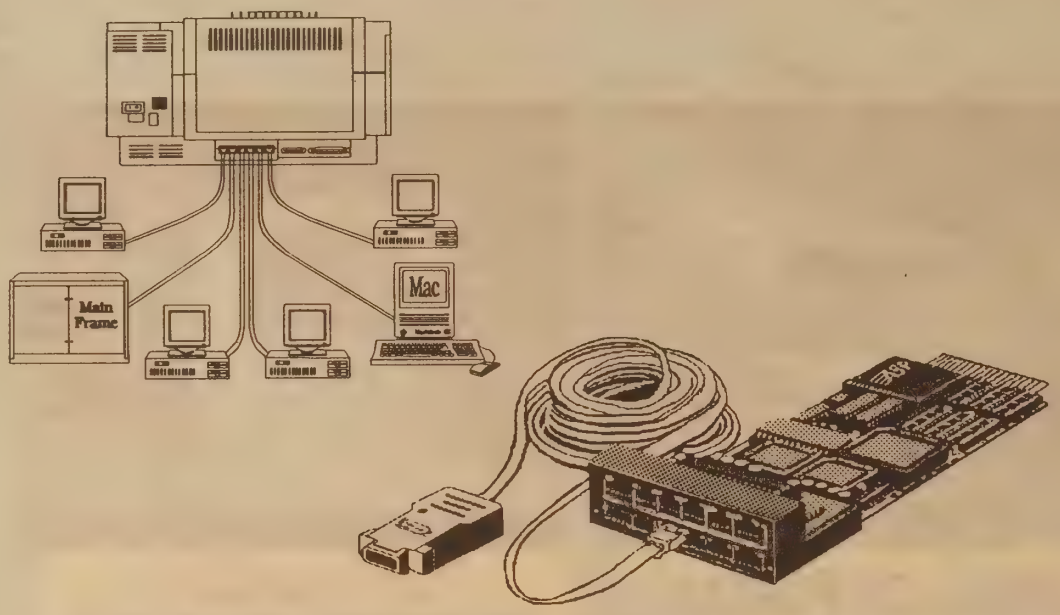

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INDUSTRY INSIGHT

Microsoft Buys Fox, Intel Sues Cyrix, OS Confusion

BY PAUL HOFFMAN

MICROSOFT ENTERS DATABASE MARKET WITH FOX PURCHASE

Borland's recent purchase of Ashton-Tate has spurred Microsoft to buy the next largest PC database company, Fox Software. Although Fox had sales of only 15% of Borland/Ashton-Tate's last year, the purchase gives Microsoft an early entry to support the higher-end packages it expects to introduce in the next two years. The two acquisitions mean that the xBASE market (that is, programs compatible with dBASE III) now has two very large players who enjoy competing with each other on both technology and price.

Microsoft was clearly itching to purchase Fox or one of its competitors like Nantucket. Microsoft will trade stock worth $170 million, or nearly five times Fox's annual revenue, for the privilege of buying the privately held company. At those sums, Fox had better continue its upward trend in sales.

Many analysts feel that Microsoft paid far too much for Fox, given its future prospects. Borland now has a set of database products from the low end to the high end, and will unify them into common language and interfaces within a year, further solidifying Borland's 70% lock on the market. Other analysts point out, however, that Microsoft took on even worse odds against WordPerfect in the word processing market and is making significantly larger inroads every year.

Another advantage of the Fox purchase for Microsoft is that most reviews rate Fox's products much higher than Ashton-Tate's. One of the reason Borland could buy Ashton-Tate at fire sale prices last year was that despite its huge market share, it was consistently losing ground to small companies like Fox. Fox's products, such as FoxPro for MS-DOS, often run two to three times faster than Ashton-Tate's, and have easier-to-use interfaces. But even with worse performance, people bought dBASE products because of the Ashton-Tate name. It remains to be seen if Borland can fix those problems in future releases of the products over the next two years.

It also remains to be seen if Microsoft will screw up the good customer relations that Fox has built up. One of the main reasons Fox could survive at all was its commitment to customer service and to supporting application developers who used FoxBase in their products. Microsoft's record of supporting developers in similar situations is spotty at best. If they take the best parts of Fox (the high-quality software) but change the corporate culture significantly, Microsoft could lose many customers to Borland in the same way that they did with the C compilers. David Fulton, president of Fox, has said that the entire development team is moving to Microsoft headquarters in Washington; he hasn't said what will happen to the marketing and support staffs.

Microsoft's move changes the database market mostly on the low end. Its widely expected Cirrus product will compete more in the middle as a front end for FoxPro and remote databases. Borland and Lotus already have such products, and the market for them is fairly weak. The biggest sales come from the low-end products like dBASE, FoxPro, and Paradox. Microsoft could up the ante by bundling various modules from Fox in its other products, such as its C compiler or Visual Basic, but so can Borland. Microsoft rarely prices its software on the low end of the spectrum, so it can't even start a real price war without being hurt by Borland's normal strategy of winning over converts with special deals.

The most likely result of the purchase is that you'll see more database features in the non-database products from both Microsoft and Borland.

Continued on page 242

Paul Hoffman is an industry analyst who has been covering microcomputer technology for ten years. He can be reached on Internet (phoffman@well) and MCI Mail (264-3171). He also writes popular microcomputer books.

Many analysts feel that Microsoft paid far too much for Fox, given its future prospects against Borland. Borland now has a set of database products from the low end to the high end, and will unify them into common language and interfaces.

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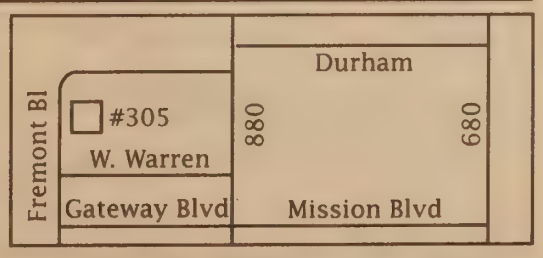

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Leading Congressional Candidates Endorse Cyberspace Civil Liberties

BY JIM WARREN

REALIZABLE FANTASIES

This column usually concerns near-future technology—viable possibilities for the next two to five years—enjoyable to write; perhaps entertaining and/or profitable to read.

However, there comes a time to sally forth from our technoids' safe-haven and attend to the larger impacts of our innovations—for we are the ones who understand their double-edged potentials. This is such a time.

A time to Stand Up and Be Counted! Mount the Ramparts! Smite the Wicked! Defend Freedom! Protect Privacy! A gigabit to every door; a palmtop for every hand! (Oops, that's for 1996.)

NOT SINCE GUTENBERG—AND NOT SINCE THE THIRD REICH

Not since backroom printing presses of the revolutionary 1700s has technology offered such powerful tools enabling citizen-based freedom and democracy. This time, the power is via networked personal computers. And, not since Hitler's Third Reich and Stalin's Russia has technology so threatened personal freedom, equitable democracy, and personal privacy.

Which will dominate depends greatly on guaranteeing that 18th century civil liberties—speech, press, assembly, limits on search and seizure, etc.—are protected against technological encroachment in the 20th (and 21st) century.

Various congressional candidates have now made formal, written commitments to specific action to assure that Bill of Rights protections remain invariant regardless of new technologies. [See the March *MicroTimes* for a model candidate's statement to which they responded.]

THESE CANDIDATES COMMITTED TO ELECTRONIC CIVIL LIBERTIES

Do try this in your own home: These congressional candidates (party, listed address, House District) signed the complete model statement:

California Assembly member **Ted Lempert** (D, Redwood City, seeking 14th House seat) was the first major-party candidate to sign and return the model statement [see sidebar], unmodified—within two days of receiving it. And he did more than just "sign up." He faxed a two-page letter detailing various technology/privacy concerns—credit databank errors, consumer tracking, etc.—illustrating unusual awareness of the issues. He concluded his explicit commitments to act, saying, "We need to have the moral resolve of our predecessors to confront the challenges which are before us so that future generations shall have a realistic chance of preserving personal liberties."

San Mateo County Supervisor **Tom Huening** (R, Belmont, 14th House seat) signed two days later, without knowing of Lempert's response. Huening already has backing of the liberal Lincoln Club, Hewlett-Packard founder David Packard, etc.

After two faxes and snailmail, former Assembly member **Dixon Arnett** (R, Palo Alto, 14th), San Mateo County Supervisor **Tom Nolan** (D, Menlo Park, 14th), and Intel staffer **Mike Maibach** (R, Menlo Park, 14th) signed up, within an hour of hearing that this column was "on deadline," and that Lempert and Huening had committed. Arnett added that he was an Assembly cosponsor of California Constitution's Privacy section.

Thus, of those seeking the 14th Congressional seat that I contacted, all of the Republicans and two of the four leading Democrats signed. That San Francisco Peninsula district covers from San Mateo to Cupertino, including much of Silicon Valley.

Then there are the **Libertarians**:

Lots o' Libbies use the computer nets. I sent only one electronic copy to only three local activists—but the Libertarians signed up *en masse!* These included: **June Genis** (Woodside, Senate), **Richard Boddie** (Senate short-seat), **Chuck Olson** (Palo Alto, 14th), **George O'Brien** (12th), **James Elwood** (8th), and even **Alan Barksdale** (Huntsville, **Alabama** 5th) who responded by email. Libertarian state-office signatories included **Will Wohler** (3rd state Senate), **Anton Sherwood** (12th Assembly), **Mark Valverde** (13th Assembly), and **Robert Goodwyn** (Sunnyvale, 22nd Assembly).

Not since backroom printing presses of the revolutionary 1700s has technology offered such powerful tools enabling citizen-based freedom and democracy. And, not since Hitler's Third Reich and Stalin's Russia has technology so threatened personal freedom, equitable democracy, and personal privacy.

Copyright © 1992 by Jim Warren, 345 Swett Rd., Woodside, CA 94062; email/jwarren@well.sf.ca.us. All rights reserved. *Jim Warren founded InfoWorld, the DataCast proposal for paperless electronic newspapers, Wireless Digital, Initiative, Inc., and one of the nation's largest public microcomputer conventions. He was founding host of PBS's* Computer Chronicles, *founding editor of* Dr. Dobb's Journal, *and has chaired various computer trade and professionals' organizations. He holds graduate degrees in computing (Stanford), medical information science (UC Medical Center), and mathematics.*

He organized and chaired the landmark First Conference on Computers, Freedom & Privacy (1991), received one of the first Electronic Frontier Foundation Pioneer Awards (1992), and is a member of the board of directors of Autodesk, Inc.

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Sherwood added, "We knew instinctively that we *had* to support [the March *MicroTimes*] proposal. ... Any candidate that thinks this is a non-issue doesn't know history. Each new technology has had to fight for its rights...."

I assumed my original model statement was probably too extreme for serious candidates—why, it was as adamant as the Bill of Rights! So its cover letter asked candidates to merely use it as a starting point. It's reassuring to find that major, electable candidates support it.

THESE CANDIDATES GAVE LIMITED COMMITMENT

Two other candidates—one, the leading Republican contender for the six-year US Senate seat—responded, but did not commit to explicit action (complete copies available):

US Representative **Tom Campbell** (R, Stanford, Senate) said that he "would work to ensure that the freedoms to which we are entitled as American citizens are not whittled away simply because we adopt new technologies...." His statement noted, "A citizen's reasonable expectation of privacy should always be protected," and said, "Within protected zones of privacy, government intrusion must ordinarily be justified by probable cause and judicial discussions," and offered observations about technological threats. Campbell is the most liberal of the three Republican candidates for that seat, is backed by Dave Packard *et al.*, and now serves on the House Science, Space and Technology Committee, among others.

Longtime computer pro **Glenn Tenney** (D, San Mateo, 12th) is opposing incumbent Tom Lantos. He has discussed his candidacy online for several months, and responded by email. Saying he has "for years fought for just such constitutional freedoms," he added, "...my platform notes that we must stop having technology abuse us and having us abuse technology; and that our privacy at home, on the job, and in every aspect of our lives must be protected...." He declined to commit to authoring electronic civlib legislation in his first year, and questioned many of the positions in the model statement, but offered few alternatives.

THESE DIDN'T RESPOND DESPITE MULTIPLE REQUESTS

In spite of two or three faxes and snailmail in two weeks—all noting that non-respondants would be listed in this column—these 14th District candidates didn't call, write, fax, or respond in any way.

County Supervisor **Anna Eshoo** (D, Atherton, 14th) never responded—unsurprising to my high-tech neighbors and myself, who have clashed with her for years. We opposed her voting herself a 28% pay-raise five weeks after her last run for Congress, and her later advocacy of a $100,000+ "retirement benefit" after three terms. She supported authoritarian building inspectors, door-to-door surveillance, huge county fees, and draconian regulations. Illustrating technical competency, she voted to prohibit homeowners' use of government-approved, code-approved, inexpensive, easy-to-install plastic sewer pipe. Justification: It was a health hazard and might conduct fire. (Honest, it's in the record!) The plumbers' union was pleased. She's the only woman in a field of nine Democrats.

Palo Alto attorney **James Blackman** (D, Palo Alto, 14th) also never responded to multiple requests.

Citizen Political Action To Protect Electronic Civil Liberties: Update

In March, this column included a "model candidate's statement" that readers could send to their local politicos. I sent copies to the major congressional candidates, locally.

Paraphrasing the Bill of Rights, its signatories would commit to promptly introducing legislation to protect traditional civil liberties against abuses excused by changes in technology. (Copy available upon request; address at end of column.)

It asked that candidates commit to specific action protecting computer-based speech, online press, and teleconferenced assembly, just as the Bill of Rights more clearly protects voice-based and hand-written speech, paper-based publication, and face-to-face assembly. They would defend thousands of non-suspects from search and seizure of confidential files and communications in "electronic post offices" or stored in shared "information vaults"—when a search warrant names only one or two users of such shared systems. Regarding seizure of data while investigating a misdemeanor or other crime, these candidates would limit seizure to the "electronic file cabinet"—disks, diskettes, tapes, etc.—rather than an entire "electronic home or office," e.g. every computer system, telephone, and audiotape player in sight, as has been taken in recent raids. Finally, candidates would remove forfeiture as an incentive to seize computer systems by computer-hungry agencies (alleged in San Mateo County and elsewhere), and stop officials from holding expensive systems as ransom until un-charged suspects forfeit their statutory or constitutional rights and protections (alleged in Santa Clara County and elsewhere).

This May column, the last one before the June primaries, lists candidates who signed the model statement, and those who offered other comments—and those who didn't bother to respond to this constituent and voter request.

After the June primaries trim the field, let's try again. Expect another update in my October column.

FOR FUTURE COLUMNS

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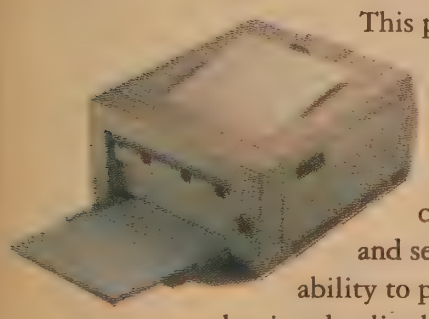

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MacWEEK *called the LX-29000 "an unbeatable combination of price and performance."*

PC World *said ".. the LX-29000 delivers graphics quickly, finishing first on our PageMaker and Excel tests."*

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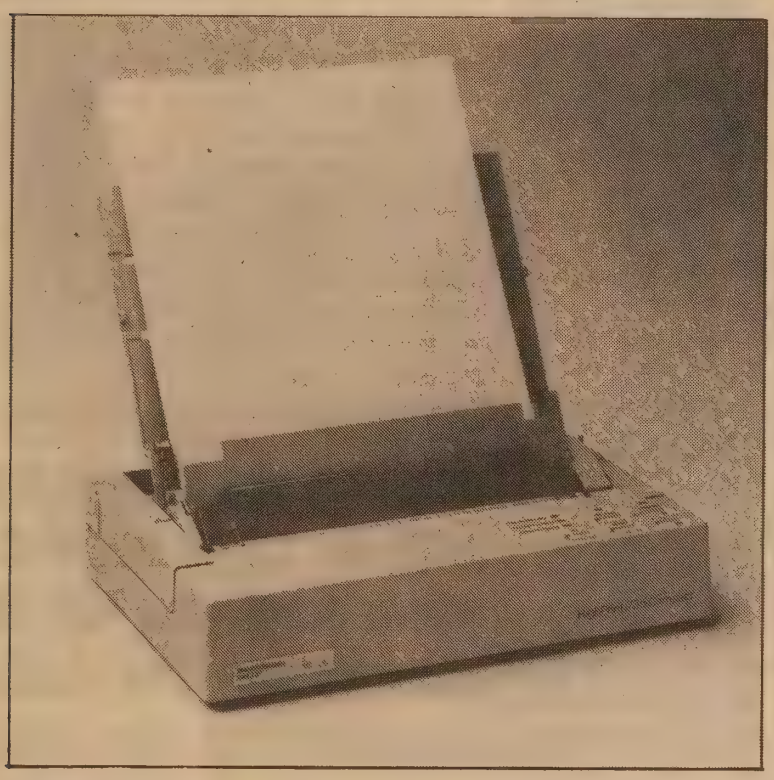
Exceptional Quality For Portable Printing

The MT735 From Mannesmann Tally Sets A New Standard For Printing Documents When You Are Away From The Office

BY ED KAHN



Portable printers are nothing new, they've been around for several years. But, until now, there has almost always been something to remind you why you looked forward to returning home to that faithful, desktop laser printer. Well, there is finally another choice. While not inexpensive, it really does offer laser printer quality—although not laser technology—and all of the other features you demand.

Mannesmann Tally's new MT735 is in a class by itself. The company has targeted this printer at professionals who require laser-quality output and speed at off-site locations. This printer, weighing just over 8lbs., works at six pages per minute and has a built-in cut-sheet feeder that holds close to eighty sheets of paper. It uses thermal transfer technology giving its best results with high-quality smooth papers, although it will work with standard copier paper.

There is a lot to be excited about with this printer. The overall size of the unit is roughly 8.5" x 11" x 2." There are no separate pieces to assemble, although there is a metal grill that holds the stack of paper in place, but it is not essential to the operation of the printer.

There is also a power supply that can run the machine or recharge the built-in nickel cadmium battery. For most printing jobs, the batteries are sufficient—about 150 pages can be printed on a fully charged battery. A test program that can be printed at start-up creates a graphic showing the battery life so you can estimate whether the remaining power can complete your current print job. If you work mostly in the field and return to your home base at night, you will probably never need to carry the charger with you.

The design of the unit is complex and a little difficult to figure out from the documentation. I was, however, able to load paper and get everything in running order before I needed to consult the instruction manual. To actually make the printer work, I had to revert to the tried and true rule of, when all else fails, read the manual. This printer is really an engineering marvel. Closed it looks like a rectangular box, but by pushing buttons and pulling on pieces of plastic, when it is fully unfolded, it looks like a conventional printer with paper stacked at an angle against a support.

Before you use the printer the first time, you have to go inside the box and set two banks of dip switches. These configure the printer for the emulation of your choice as well as tell it whether you are using legal, letter, or A4 (European) size paper.

One of the real beauties of this printer is that it has four printer emulations from which to choose. In practical terms, this means that you are not dealing with an oddball configuration. For me, using the HP LaserJet Series II means that I can use the same printer driver at home and in the field. I use a real LaserJet III as my desktop printer and the Mannesmann Tally printer worked flawlessly for most applications with that driver.

Other emulation options include the Hewlett-Packard DeskJet Plus, IBM Proprinter X24, and Epson LQ850. The 1MB of memory included with the machine allows you to print graphics and download fonts in the HP LaserJet emulation. And finally, there are fourteen resident fonts.

This is a sophisticated printer. There is a built-in memory of the last page printed. The purpose of this feature is to allow you to make multiple copies of documents. By pressing the copy button on the top of the machine, additional copies are spewed out.

The MT735 utilizes a thermal transfer technology, but has a ribbon that is the full size of the paper. It is a single-pass ribbon, so it always makes a perfect print. Because the ribbon is full paper size, users working with sensitive material must be careful when disposing the spent ribbon, it contains a full record of everything that has been printed. Thermal transfer not only makes beautiful prints, but also allows you to control the density of the finished copy. The control panel has a switch offering three different density settings to give you additional control. This feature is especially useful as you switch

RESOURCES:

MT735 Portable Printer, $1295
Mannesmann Tally Corp.
8301 S. 180th St.
Kent, WA 98064-9718
1-800-843-1347

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from one quality of paper to another. Another advantage with the MT735 over real laser printers is that there is no warm-up time so the first page comes out almost immediately.

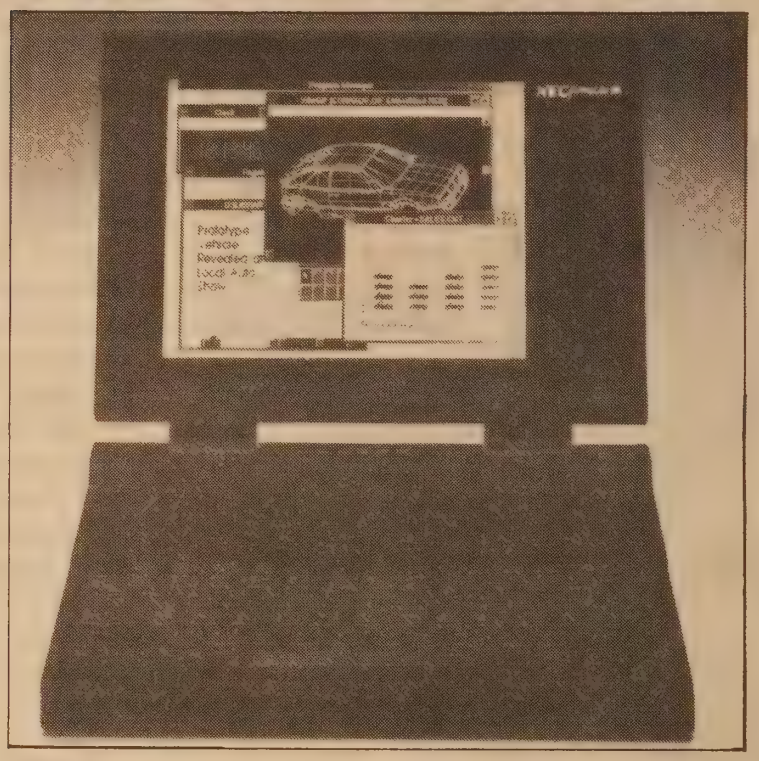
Every aspect of the design of this machine has been well thought out. The ribbon will last for about the same number of prints as the battery. This means that everything runs out at the same time. Ribbons cost $75 for a set of five. This all translates to a cost of about ten cents per page.

While the battery can be recharged anywhere in the world, it may be necessary to buy a European power supply ($38).

A final option is a carrying case, which has a suggested retail price of $60. If your budget can handle this machine, you will certainly be pleased with its capabilities and performance. This is the portable printer to put on your wish list. ■

Computer Of The Month

NEC's UltraLite III



The first small notebook computer was the UltraLite from NEC. While ground breaking, it had serious shortcomings. Over the years, NEC has stuck with the same basic design while modifying the machine to keep up with the most advanced technologies available. Their newest incarnation, the UltraLite III, is a pleasure to work with and resolves most of the complaints associated with the earlier versions.

The UltraLite III features a 20MHz, 386SX processor and has a 60MB hard drive. The complete package weighs 4.8lbs. and measures 9" x 11.5" x 1.5". In order to get so much packed into such a small space, they designed an external 1.44MB, 3.5" floppy drive that connects to the right side of the computer and can be left behind or packed away separately from the computer. This configuration works well. The drive itself is small and lightweight. The computer itself comes with MS-DOS 5.0, Windows 3.0, and 2MB of memory, expandable to 10MB.

The 9.4" LCD display offers a clear VGA display. If you need color, you can attach a VGA monitor to the video port on the back of the unit. The monochrome LCD handles thirty-two shades of gray.

The keyboard on the UltraLite III has seventy-eight keys. The general layout is pretty much what you would expect in such a small unit. With a computer as thin as this, it is not unreasonable that the keys do not offer full travel. However, you must use two keys to access PgUp, PgDn, Home, and End. Other lightweight notebook computers have arranged their keyboards to avoid this inconvenience. If you want to attach a full-sized keyboard, there is a port available for either a PS/2 keyboard or a mouse. You must, however, buy a special Y cable if you want to use both of these input devices. In the interest of space, the port was designed to only work with NEC's special adapter cable. NEC offers another option—a ten-key numeric keypad ($129) that, when attached to the computer, gives a nearly full-size keyboard.

NEC recognizes there are tradeoffs from using such a small machine and has designed a docking station ($899) to remove most of the undesired effects. With the docking station, the system weighs close to 15lbs. It is interesting to note that only a few years ago, that was about the same size as a standard portable computer. The docking station has room for one full-size or two half-size AT cards, and will hold a 5.25" drive.

The battery pack that fits inside the UltraLite III only gives about two hours of power. You can buy extra battery packs ($109) or a battery slice ($269) that will give you up to five hours of battery operation when coupled with the internal nickel cadmium battery.

Over the years, NEC has stuck with the same basic design while modifying the machine to keep up with the most advanced technologies available. Their newest incarnation, the UltraLite III, is a pleasure to work with and resolves most of the complaints associated with the earlier versions.

The documentation that comes with this unit is thorough and excellent.

I really enjoyed this computer. Everything worked to perfection. If weight is a major consideration, then this is certainly a computer to check out. NEC has packed about as much as is possible into this small unit. The real question is whether the tradeoffs are worth it for your needs. ■

RESOURCES:

UltraLite III, $2699
NEC Technologies, Inc.
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Boxborough, MA
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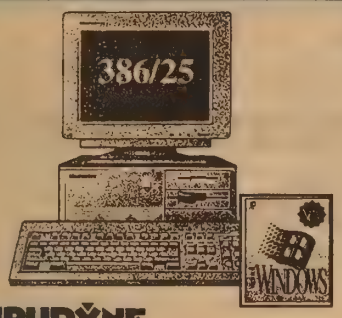

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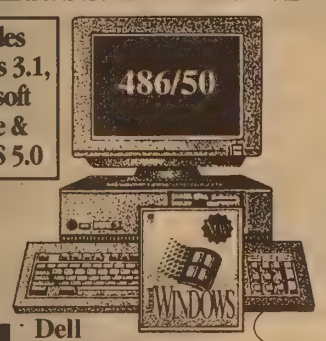

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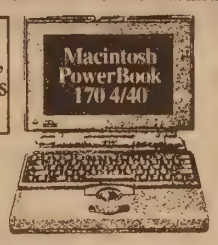

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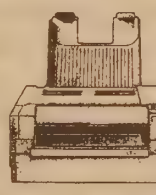

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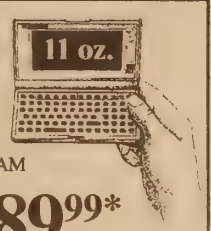

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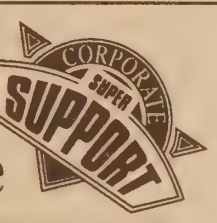

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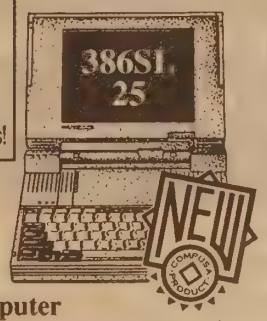

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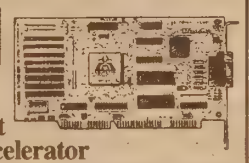

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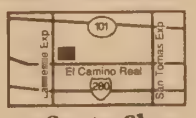

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1-2-3 For Windows: Worth The Wait

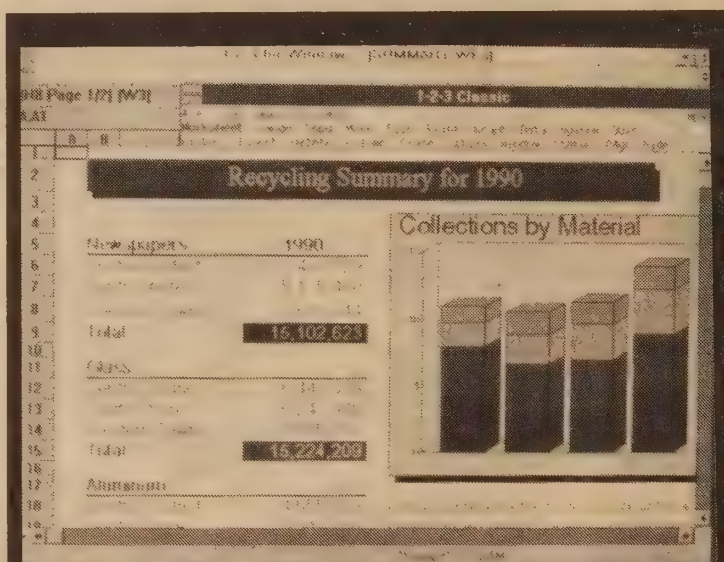
Prepare Yourself For The More Sophisticated Formatting And Working Capabilities Of The WYSIWYG Windows Environment

BY WOODY LISWOOD

There is an old saying that all good things come to those who wait. Well, after a *long* wait 1-2-3 for Windows has arrived, and it works very well, thank you.

1-2-3 for Windows (1-2-3W) has all the features of the DOS versions 2.2 and 3.1. To ensure a smooth transition for its DOS users, the Windows version offers the ability to use the same slash command menus. 1-2-3W also supports "always format" files, letting you import your older work originally done under DOS without having to reformat everything. This also means you don't have to change any of your keystroke patterns when you move to Windows.

However, after the move to Windows, I would set aside the cravings for DOS and slash command menus, which originated in the dark ages of Visicalc, and prepare yourself for the more sophisticated formatting and working capabilities of the WYSIWYG Windows environment.



There are several new @ functions that you might expect now that you can have linked spreadsheets and linked databases, as well as new macro commands that support these new features.

1-2-3W includes many new features. Smart icons that let you customize almost any function to be carried out with a mouse click. The ability to have up to 256 separate spreadsheets in memory simultaneously and linked. The ability to have more what-if tables and to link to external databases. The ability to use DDE (Dynamic Data Exchange) links to other Windows Applications, Solver and Backsolver commands, and lots of new specialized commands to support all those Windows functions that just don't exist at the DOS level.

There are several new @ functions that you might expect now that you can have linked spreadsheets and linked databases, as well as new macro commands that support these new features.

Over the past few years, I've noticed two types of spreadsheet users. The power user who can drive a spreadsheet to do everything that computers do and looks at the macro language as a methodology of programming in the Lotus language. They represent about 1% of the users. The rest of us just use spreadsheets to solve problems. We do a wide variety of tasks with a spreadsheet, but don't get into doing complicated statistical calculations and linear programming. We are the other 99% of spreadsheet users.

If you are one of us, this other 99%, 1-2-3W is a great product and is now available.

If you are that power user, you may be bothered by the loss of speed, and by the new complexity of its macro language. The ultimate jigsaw puzzle just got larger, more complex, with more pieces and a slower engine.

If you are an Excel user, you probably will not like 1-2-3W. It's 1-2-3, not Excel. Things are different. While many of the menus do the same things because of accepted Windows conventions, other things will not be at all obvious. Excel has much more experience in the Windows environment, and lets you do more things easier. For example, the first difference I noticed between the two products was that while Excel lets you select an entire row by clicking and dragging on the row number column, this doesn't work in 1-2-3W.

Overall, 1-2-3W is probably going to be an important factor in the marketplace. You can't go wrong using it. By the next release, Lotus will have begun to conquer Windows and the differences between Excel and 1-2-3W will recede. AMI PRO for Windows is a great product. 1-2-3W holds its own in the spreadsheet wars. Freelance for Windows will round out what Lotus is calling the Windows Suite. There's lots of good stuff here. If you were waiting for Windows to mature, this should help you make that important decision. ■

RESOURCES:

1-2-3 for Windows, $595 (Network server version, $895; node version, $595; upgrade from earlier versions or other spreadsheet programs, $150)
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55 Cambridge Pkwy.
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(617)577-8500

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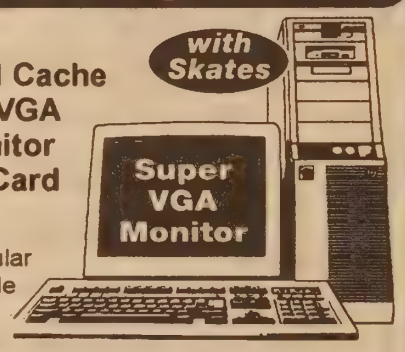

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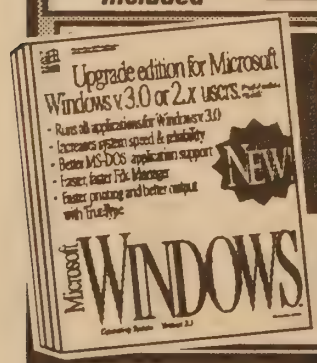

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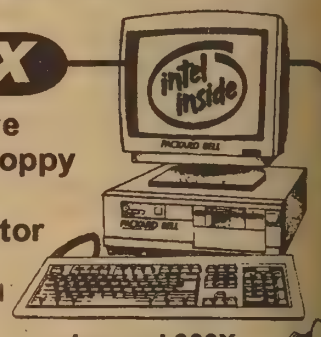

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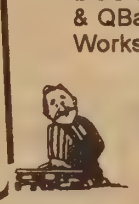

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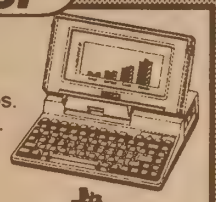

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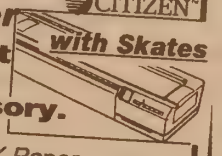

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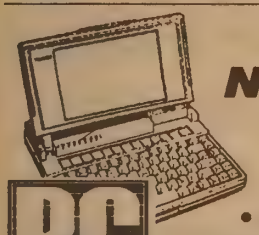

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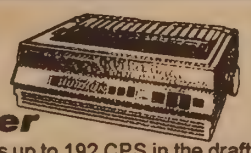

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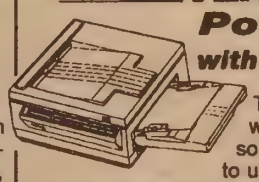

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Freedom From The Floppy

Diskless Workstations On A LAN Can Improve Your Company's Security, As Well As Save Money And Time

BY PETER JOHN HARRISON

The intruder approaches his target. Assisted by a careless employee who has forgotten to sign off, he copies vital company information to a floppy disk and makes his exit, unnoticed...

O.K., I'm being melodramatic...but that doesn't mean this scenario is pure fiction. Computer security in the age of LANs is a real concern, and individual PCs on the network can become a security nightmare. Through seemingly innocent disk drives, uninvited guests can gain access to confidential corporate files and take them off-site; employees, unaware of the damage they may cause, can introduce harmful computer viruses while copying a "pirate" version of their favorite word processing program (or computer game) to the system; and other employees may violate your software licensing agreements by copying company software for use at home.

Workstations that boot from disk have other liabilities, too. Updating the network drivers, DOS versions, and other software required at start-up can be a major hassle—particularly where workstations are inaccessible. Downtime caused by damaged or misplaced diskettes and periodic failures of the drives themselves always seems to occur at a bad time, forcing deadlines to be missed and the productivity of LAN users and administrators to plummet.

Given, then, that booting from disk can be a hassle, and most LAN users don't need a floppy or hard drive to get their work done anyway, why buy workstations with disk drives?

Novell NetWare and Microsoft LAN Manager both support diskless workstations, which read their boot instructions from a chip plugged into the network interface card and a boot image file stored on the file server. And, contrary to what most people expect, setting up a diskless workstation is pretty easy, provided the network interface card used has a socket for a boot ROM.

Recently, I bought seven 386SX PCs and set them up as diskless workstations. Five of the workstations came with Intel TokenExpress cards and boot ROMs, the other two I equipped with Proteon p1390 network cards I removed from older equipment and boot ROMs I ordered with the workstations.

Getting the five TokenExpress-equipped workstations running was a quick, easy process. After setting the DIP switches on the TokenExpress card (Intel has excellent instructions on what settings to use), I created separate boot diskettes for each workstation, just as I would have if they'd had disk drives. Then, while signed on as a "supervisor," I ran Novell's DOSGEN utility to transfer the contents of each diskette to separate boot image files in the file server's LOGIN directory. The network also needs to know which boot image file goes with which workstation, so I used EDLIN (any ASCII text editor would work just as well) to create a BOOTCONF.SYS file listing each card's ID number (displayed on the computer screen by the TokenExpress card when the workstation is turned on), the name of the network the workstation would be attached to, and the name of the boot image file to use for that workstation.

After doing this, all I had to do was plug the workstations into the network, an electrical outlet, and turn everything on—all five of them worked immediately. From start to finish, each workstation took about twenty minutes to configure.

The Proteon p1390 cards, however, were a different story. After several attempts to configure these cards, I called their technical support number. My problem was simple—I was using older IPX drivers, and needed to download the current driver software and incorporate it into the Proteon workstation boot diskettes. Once I had the current drivers, setting up the two remaining workstations went smoothly: I set the jumper pins according to the instructions, used the downloaded driver files to build IPX drivers to match my card's settings, updated my boot diskettes with created boot image files, and added the new workstations to the BOOTCONF.SYS file. With the new drivers in place, the remaining two workstations appeared on the network with no problems.

Outdated drivers are always a good place to start looking when you're having problems adding new equipment to your LAN. It's not a sure cure for trouble, but since most network card vendors let you dial-in and download their current driver software for free, it won't cost you much time or money to stay current. So, if you're converting older cards for use in diskless workstations, you might want to plan on updating your drivers before you create the boot disk, and possibly save yourself some aggravation later in the game.

Outdated drivers are always a good place to start looking when you're having problems adding new equipment to your LAN. It's not a sure cure for trouble, but since most network card vendors let you dial-in and download their current driver software for free, it won't cost you much time or money to stay current.

Diskless workstations not only help keep your data safe, they cost less, have fewer mechanical parts to wear out, are easier to maintain (especially true for workstations in locked offices or at other locations), and are less attractive to thieves. (Who wants to steal a computer without a hard or floppy disk drive?) Workstation users like them, too, because there are no disk drives to whine, grind, or whir.

Anytime I can save money, improve security, and reduce long-term downtime, I'm happy. Going diskless is a great solution anywhere you need a workstation, but don't need a floppy or hard disk to get your work done. ■

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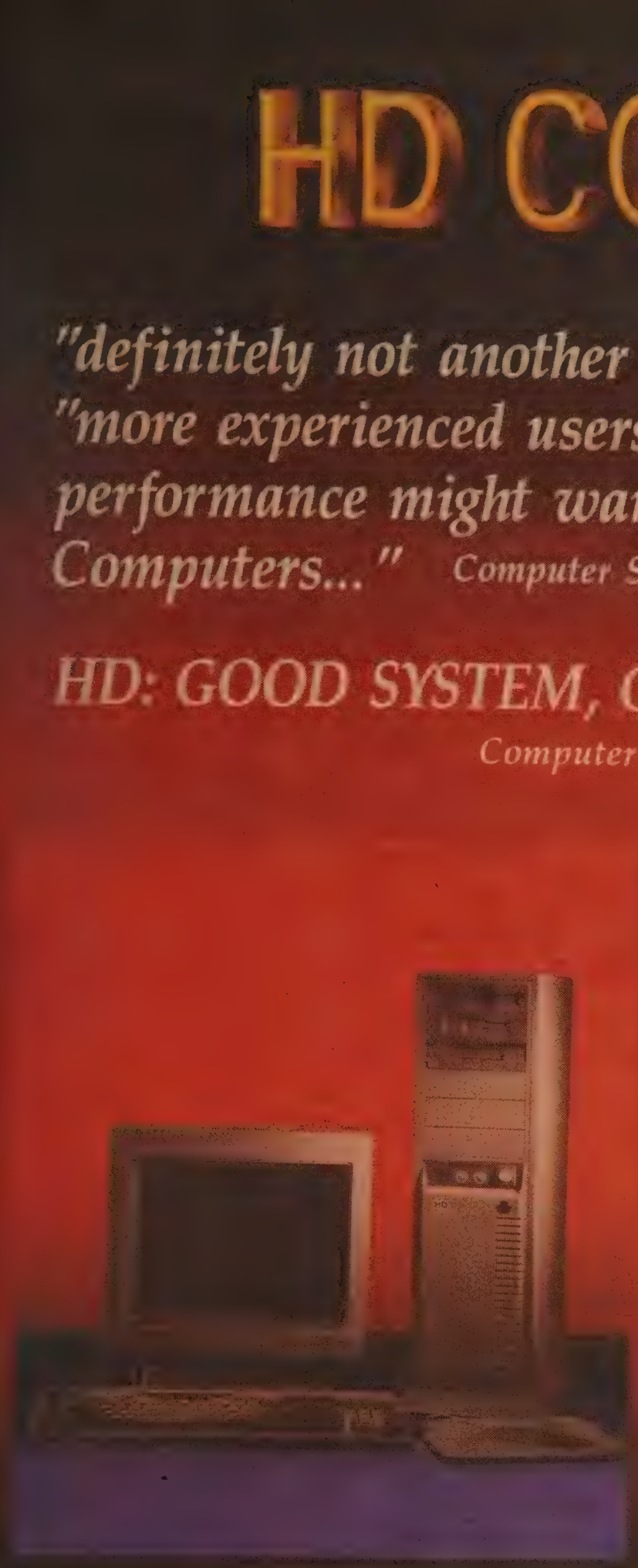

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Retraining To Remain Competitive

Joint State-Employer Training Program Helps People Keep Jobs And Companies Stay In Business

BY MICHAEL ROBIN

Computer-aided design (CAD) is a vital component for most engineering, architectural, and design businesses, so much so that knowing AutoCAD, the dominant CAD system in use today, is often a required skill to work in these and other related fields. While the US Dept. of Defense, for instance, *prefers* its contractors to submit drawing in AutoCAD format, the Canadian government *requires* this from anybody doing design business with them.

The shift to AutoCAD, away from traditional drafting, is indicative of the rapidly changing business environment throughout California. Increasing competition from other states and nations as well as demands created by new technologies have combined to put growing pressure on the state's businesses. Nowadays, it is not enough that machinists are skilled with the tools they have been using for the past five or ten years, they need to have basic skills for working with AutoCAD. Many drawings are showing up at the machine shop not as a blueprint to fabricate to, but as a database on a floppy disk, which is fed into a Computer Numeric Controlled machine for the manufacturing of a part.

As CAD software has become more sophisticated, the costs for insufficient training—measured in both time and money—have skyrocketed. Mary Sugden, cofounder and director of the AutoCAD program at the Copper Connection in Santa Clara, points out that "it only costs $4000 to $5000 for hardware with AutoCAD on it. But it is going to cost up to $25,000 to train your employee. There is some direct cost when employees are sent out for training, about $2500. But it is the indirect costs that kill the employer—while people learn to come up to speed on AutoCAD they're making mistakes. The indirect cost is being paid for in slipped schedules, scrap parts, and fixes."

Rather than retrain existing staff, employers often lay off workers and hire individuals who already have CAD experience. Clearly, this is a burden for those who are now out of work and puts a burden on the state as more and more people file for unemployment insurance. This option also carries with it unseen costs to the company. After working with a company for a while, they already know how that business operates, have developed smooth working relationships with coworkers, have some level of loyalty to the company, and equally, if not more important, they know what is expected from them in terms of quality and customer service. The time it takes a new employee to learn this can cost a company time and money in missed deadlines, rechecking someone's work, or smoothing out personnel differences. Companies have an investment in their current staff, and as competition increases and times get tougher it can be more effective to retrain staff than it is to gamble on a new employee.

STATE/EMPLOYER SUPPORTED TRAINING

In 1982, the California Employment Training Panel was conceived as an "experiment to determine whether an employer-supported training fund could be used to improve economic conditions by addressing the displacement of workers caused by recession, technology, and outside competition." It has placed a high priority on funding those types of training that would provide the greatest likelihood of long-term benefits to the state's economy.

The panel, a seven-member council appointed by the governor and leaders of the legislature, administers funds generated by the employment tax. Every for-profit business which pays unemployment tax contributes to this fund. Any qualifying business can submit a training proposal to receive funds. Existing programs include Computer Aided Design, Management Information Systems, Automotive Repair, Office Automation, Customer Service, Licensed Vocational Nursing, and Quality Improvement Processes. All funding is linked to a specific job; trainees must have jobs waiting at the end of the program. In fact, companies that establish a program earn payment only after a worker has been trained and on the job for at least ninety days.

As CAD software has become more sophisticated, the costs for insufficient training—measured in both time and money—have skyrocketed.

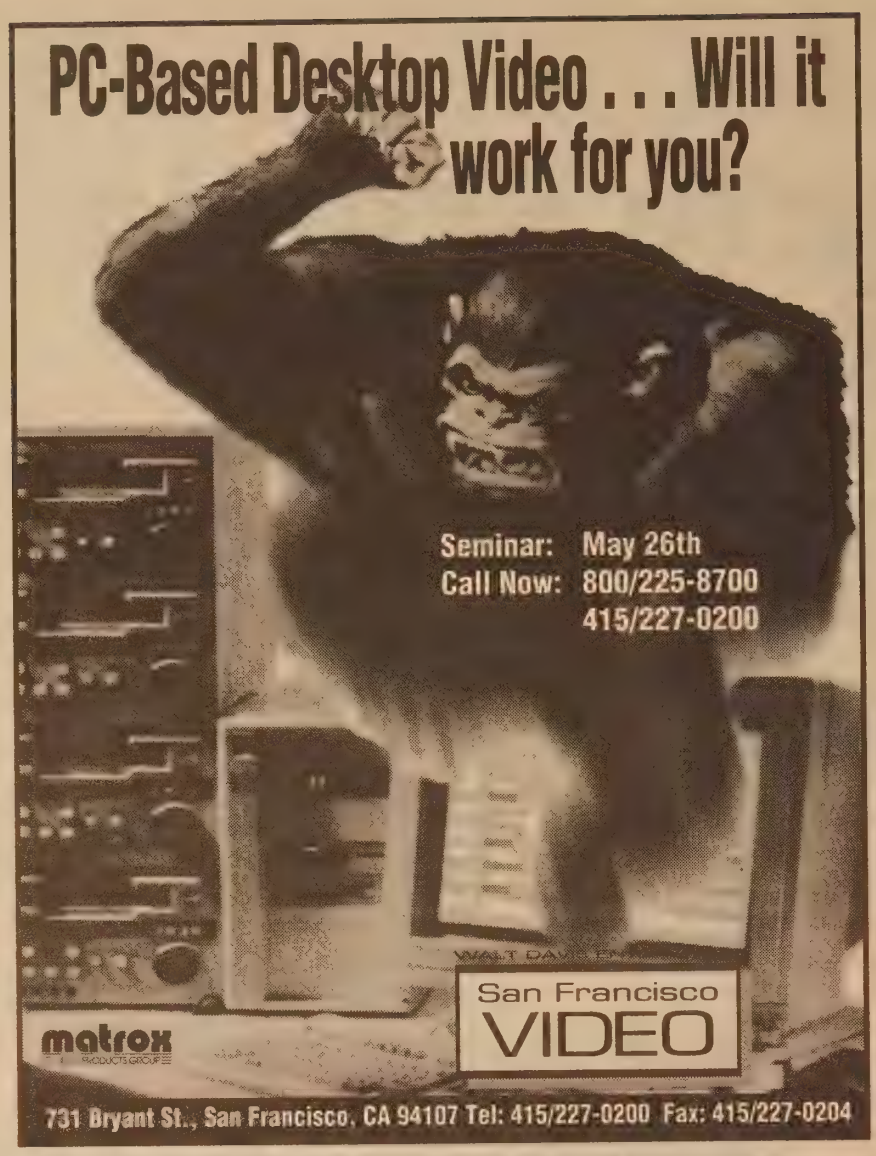
The panel targets two major groups of workers for training: those who are currently unemployed and receiving benefits, and those who are likely to become unemployed and will be claiming unemployment insurance benefits if not retrained. This second group, people likely to become unemployed, comprises the bulk of participants receiving CAD training under this program.

SERVING WITH SMALL BUSINESSES

The panel recognizes the central role that small businesses play in our economy and emphasizes working with small companies—those that have less than 250 employees. Small businesses, according to the Small Business Association, employ 47% of the private work force in the US, contribute 42% of all sales, and are responsible for 38% of the gross national product. In California, between 1978 and 1982, firms with fewer than one hundred employees created more than half of all new jobs.

For the fiscal year ending in 1991, 83% of the businesses served by the panel were small. Of these, over 70% had fifty or fewer employees. From the 816 small businesses that participated in 1990–91, 503 new hires were trained and 3316 current employees received retraining.

There are two methods to establish a contract with the Employment Training Panel. The first is direct—to contract with the panel to pay for the training of a group of employees. However, the majority of small businesses only need to hire and train or retrain one or two employees. Furthermore, smaller companies rarely have the staff or time necessary to develop and administer a contract themselves. To help facilitate working with businesses of all sizes, a second method was developed—a consortium. Of the 816 small businesses assisted,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772 were part of a consortium.

Using the consortia as a primary tool to reach small businesses, contracts have been organized through both public and private institutions. The public institutions include community colleges such as Glendale Community College, San Diego Community College, and the Santa Clara Adult School, while private training agencies have included the Copper Connection, Access Computer and Training Center, Quality Care Health Foundation, and Cogswell Polytechnical College.

CONSORTIA TRAINING: A SUCCESS STORY

The Copper Connection, the only authorized AutoCAD training center for the Santa Clara Valley, has been providing CAD training since 1984. During 1991 they were instrumental in forming a consortium to offer AutoCAD retraining using funds provided through the Employment Training Panel. The first round of training attracted one hundred students for fifty small businesses. "Most of the people who went through the training," said Sugden, "were doing either traditional drafting or traditional machine shop work drawing on boards, or reading boards."

Although the companies involved were from diverse sectors of the economy—from electro-mechanical design and drafting groups, architectural firms, machine shops, etc.—all were too small to contract directly with the panel. They also recognized the importance for AutoCAD training for their businesses' future as well as the related value gained by everyone involved from taking advantage of this opportunity presented by the state.

"The state knows that the companies can afford to buy the computers and software," said Sugden. "What they cannot afford is training the workforce. A few years back, as few as four or five years ago, a company could afford to train [employees]. The software hasn't just doubled in power each year, its gone a lot further than that. When we first started training people in AutoCAD, we could teach them everything there was to know about AutoCAD in two days. And we kind of had to stretch a little bit to fill the two days. But right now, it takes thirteen full workshop days, from 8–5, just to cover the complete program."

A WIN-WIN APPROACH IN BUSINESS

Retraining existing employees to confront the problems created by increased competition and the demands for increased levels of skills appears to be working. Everyone from administrators in Sacramento to business owners and workers look at this joint state-employer experiment as offering an important alternative to how everything used to be done. According to Sugden, "the state has been tickled with the performance and the statistics [of our training]. They are opening up the program to include more companies and 250 trainees." The Employment Training Panel gives businesses an opportunity to develop a qualified staff that can work with AutoCAD without starting from scratch and hiring new personnel, or even spending money to have your existing staff retrained. ■

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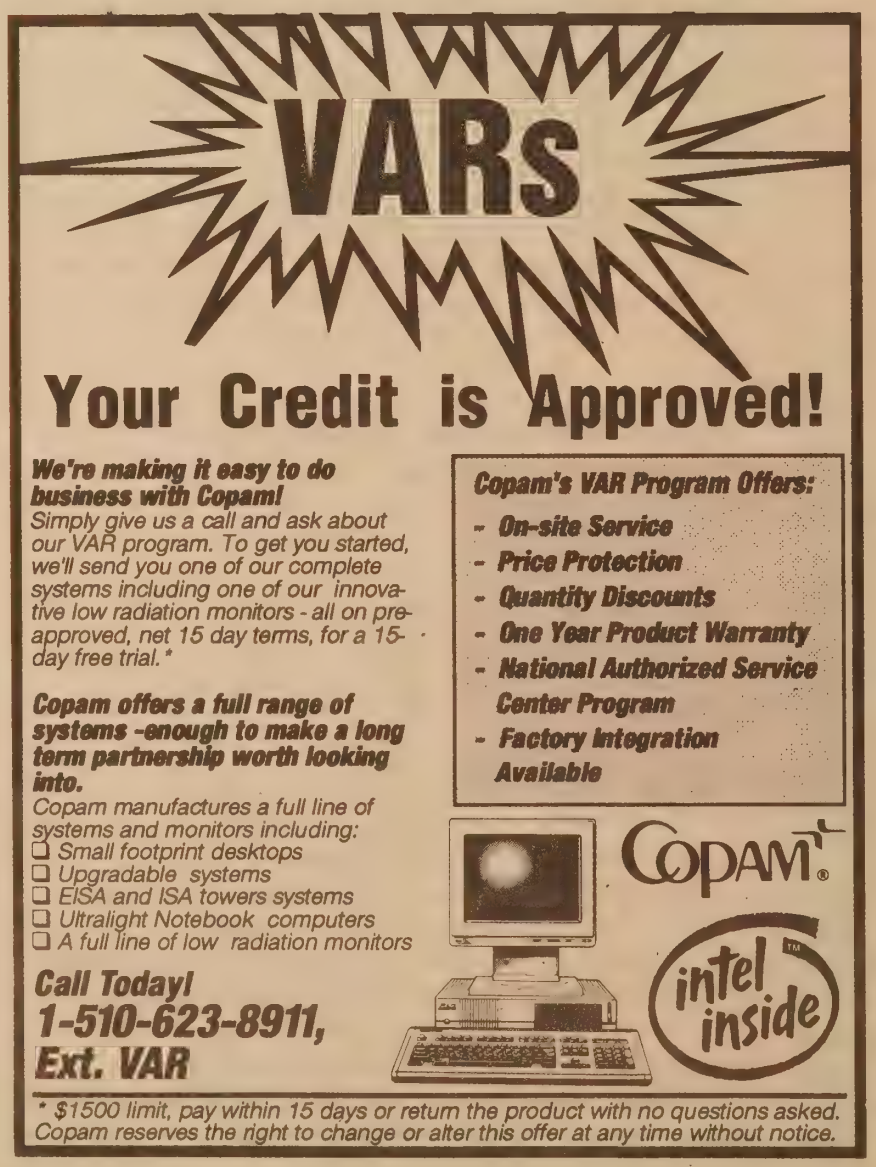
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New Idea, Existing Technology

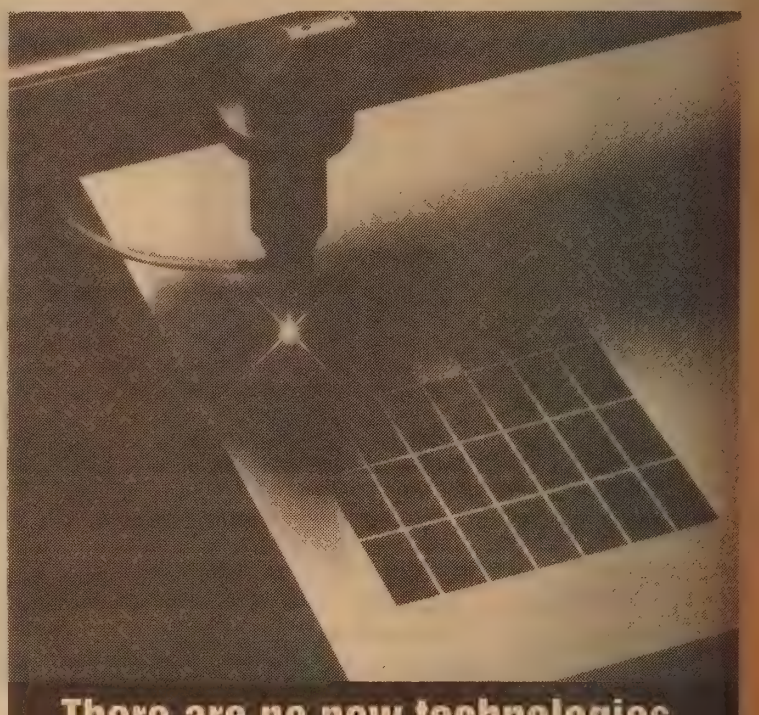
A CAD-Driven Laser Cutter Can Save Architects Time And Money While Building A Better Model

BY TONY ROCCO

Architectural models are essential to the building design process. Because it costs millions of dollars to construct a new shopping mall, civic center, or corporate office, clients want to see exactly what they're getting before a single shovel hits the dirt. Blueprints or a nice sketch won't do; a three-dimensional model is needed.

A lifelike model shows in minute detail every door, window, arch, pillar, and awning that will comprise a finished edifice. It includes landscaping, roads, cars, and even tiny munchkin occupants. Such models are usually cut and etched by hand from foam board, plexiglass, and wood. They are often redone several times before a design is finalized. These models are expensive—big ones cost tens of thousands of dollars—and can take months to complete. But there is no getting around making them.

Many large architecture firms have whole staffs of skilled technicians devoted to model making. Smaller firms that cannot afford their own staffs go to special model shops to have the work done. Architects and model makers are discovering a CAD-driven alternative to making architectural models by hand that can drastically cut the time and expense involved and help create superior models, to boot.



There are no new technologies involved—a laser, a plotter-like mechanism, and a PC running CAD files. It's just that they hadn't been put together into a single package custom-tailored to cut architectural model parts.

WORKING WITH EXISTING TECHNOLOGIES

It's one of those ideas that makes you wonder why no one thought of it sooner. There are no new technologies involved—a laser, a plotter-like mechanism, and a PC running CAD files. It's just that they hadn't been put together into a single package custom-tailored to cut architectural model parts. A few years ago, someone came along with a background in model making and architecture who understood how these existing technologies could be used to make architectural models more efficiently.

In the early '80s, architectural model maker Willy Leichter wanted a better way of making models. The architectural firm he worked for was the kind of place that would embrace new ways to make life easier, so they gave the Stanford graduate the go-ahead to implement the first CAD-driven laser cutter for producing architectural model parts. The in-house system he devised, although primitive by today's standards, offered a much improved way of cutting the small, detailed pieces that comprise architectural models.

After Stanford, Leichter moved on to Scale Models Unlimited (SMU), a model shop in Menlo Park, California, where he continued his work with lasers. At SMU, he helped implement a laser cutting system similar to the one he had put together for his previous employer. Eventually, he designed a device SMU now markets to model shops and architects: the LaserCAMM, a turnkey, CAD-driven laser cutter the size of a copy machine. LaserCAMM stands for Laser Computer-Aided Modelmaking and Manufacturing.

The LaserCAMM consists basically of a mechanism similar to a plotter (a printing device used to produce plans from a computer) that moves a laser across whatever flatbed material is being cut. The device is driven by industry-standard .DXF files output from any CAD software package. The laser can cut and scribe (score) non-metallic sheet material up to .25" thick into intricate patterns. It quietly cuts material up to 24" x 36" at a rate up to 100" per minute with an accuracy of 0.005 inch.

Leichter realized that the cost of the LaserCAMM, a hefty $125,000, was too high for many recession-struck architects and model shops to afford. Instead of selling the machine itself, he decided that selling its services, along with his expertise in model making, was the real ticket to success. In July of 1991, Leichter, backed by a venture capital firm, opened Envision Design Centers, a service center in San Francisco and Los Angeles providing LaserCAMM cut parts to architectural firms and model shops.

REAL-LIFE APPLICATIONS

One company that made good use of the LaserCAMM is Hellmuth, Obata & Kassabaum (HOK), a prestigious architectural firm based in St. Louis, Missouri. Three years ago, Gyo Obata of the firm got in-

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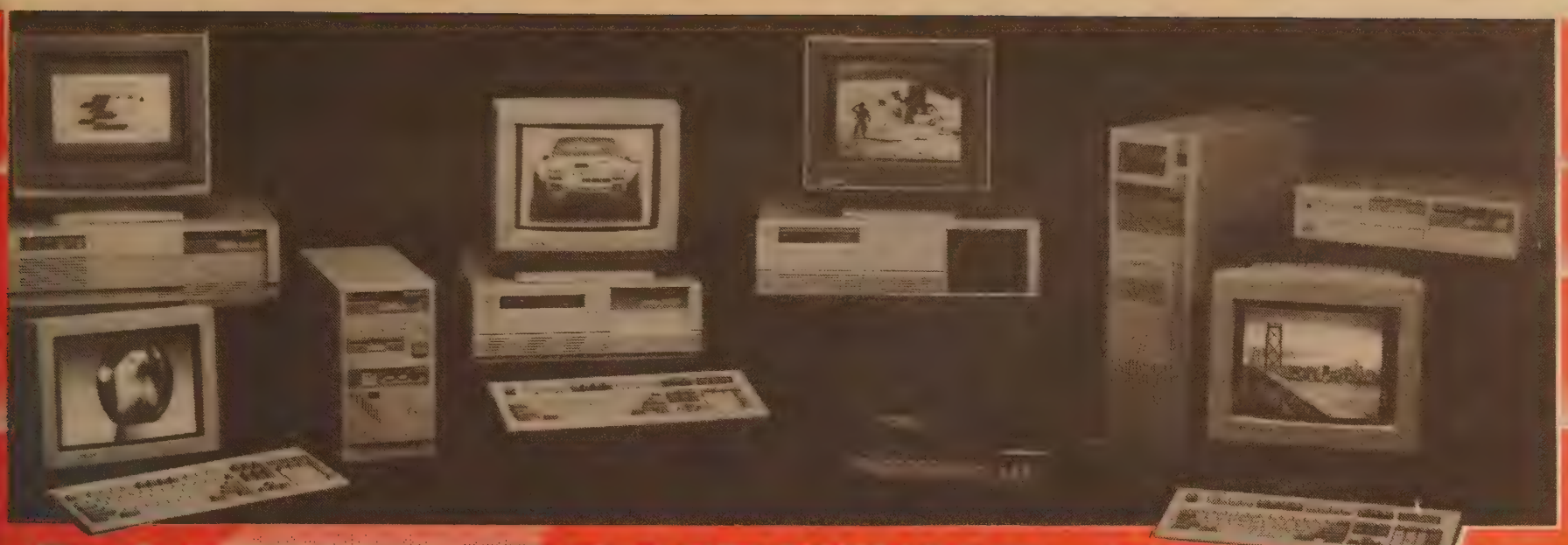
Tony Rocco is a Bay Area free-lance technical writer and journalist.



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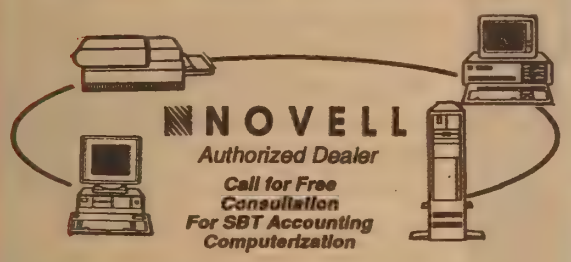

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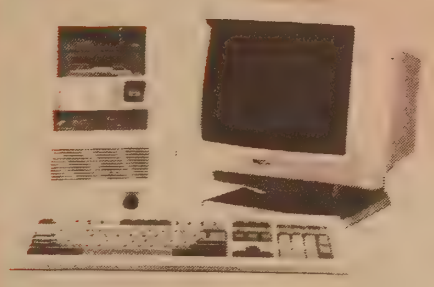

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volved in a project to renovate an historic Louis H. Sullivan building that was slated for the wrecking ball. Obata served on the board of the foundation created to purchase the Van Allen Building in Clinton, Iowa, and turn it into the Louis Sullivan Museum.

Obata had HOK's model shop make a special model of the Van Allen Building that was to be ready the day the Louis Sullivan Museum opened. Two weeks before the scheduled October 6, 1991 opening, however, the model shop had nothing ready.

"Two weeks before the thing had to be in Iowa, we had hardly anything done on it," says Rick Wood, director of HOK's model shop. "I had entered in all the data on the computer and we had made a base and a frame. But other than that, we really didn't have much to show for our work."

Wood was able to produce a finished model of the ornate building in time for the opening by having some parts lasercut by Envision Design Centers. The model was completed with two days to spare.

Wood's model shop reserved those pieces for the LaserCAMM that required the highest level of detail. "We used them [Envision] strictly as a service to achieve a level of detail which would not be possible without it. We were able to have them etch brick patterns and cornice patterns that just would not be possible any other way," says Wood.

On Wood's end, he designed the parts needed on AutoCAD, a task he found easy enough although it was his first venture into CAD. "Working on computers had always been almost a phobia of mine. I didn't have much experience and thought it would take months of training. But I learned AutoCAD pretty easily," Wood says.

A week after sending his CAD files to Envision, Wood received parts back that could be assembled very quickly. "This kit of parts came back, and it was about like getting a model airplane kit," recalls Wood. "There it all was, we figured it all out, and all the parts were there. We painted them up and put it together. It just came together real quick."

Having parts lasercut rather than done by hand not only sped things up, it saved HOK money. "We could have had eighty to one hundred hours in time on that, so $5000 or something like that, potentially [was saved]," Wood estimates. "Plus, even having spent the $5000 to pay two guys a week to actually saw and etch the parts, they would not have been as sharp and detailed as what we got."

Why can't any industrial cutting shop with a laser, a PC, and a copy of AutoCAD provide the same services Envision does? The fact is, such shops *can* provide similar services, but they usually do not understand the special needs of model makers well enough to be really useful.

"We worked with a company in Dallas," says Wood, "and they know AutoCAD and they have a laser cutter, but they just weren't as personally responsive. Their application had as much to do with all kinds of industrial applications...so they didn't really speak the same language as model makers.

"I can shoot a fax over to Envision, kind of a crude sketch and some dimension lines, and tell them to put it on 32nd-inch plexiglass with adhesive backing. They know exactly what I mean and the parts are here tomorrow."

Phoenix-based model shop Environ also prefers Envision's LaserCAMM services to generic industrial cutting shops because, "I deal with basically model builder types. They're sympathetic to my needs," says Mark Jones, production manager at Environ. Using the laser to cut many of his model parts has improved the efficiency and profitability of his shop. "What it's done for me is make it so that I can handle a greater amount of work with the staff that I've got. I can have a smaller shop and do a greater quantity of work."

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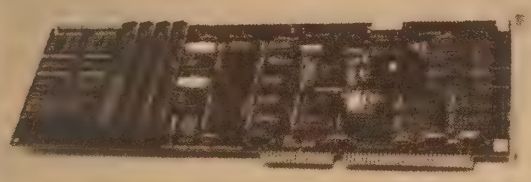

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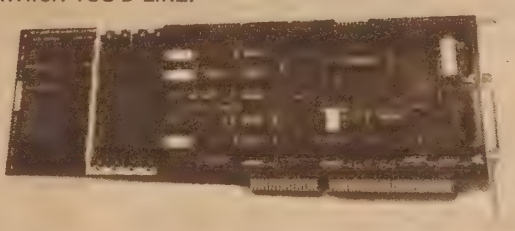

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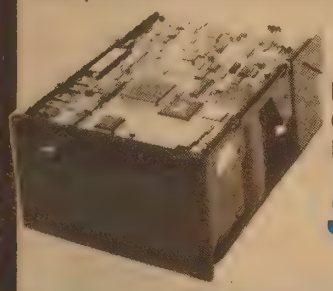

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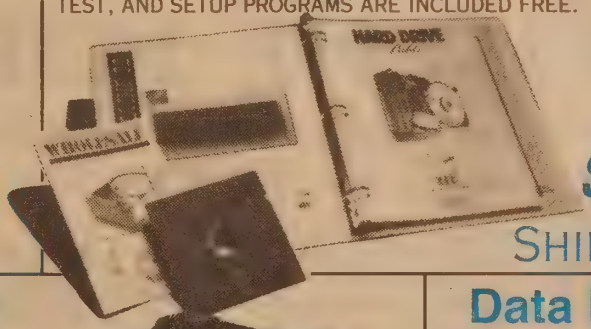

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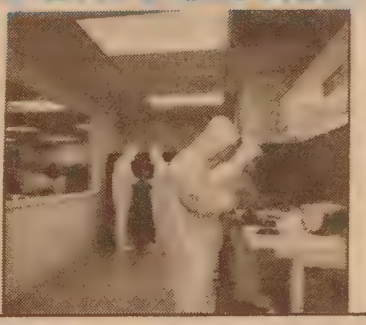

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Like Wood of HOK, Jones discovered that designing model parts in AutoCAD is fairly easy and greatly shortens turnaround time. "I learned to use CAD specifically to produce the parts for models," Jones says. "I didn't actually know about CAD graphics; it's really quite simple."

And so is the rest of the process, Jones has found. "Basically, I generate the parts I need produced on my own computer. I modem the [CAD] files to them in the middle of the night when the rates are cheap, and when Envision's staff shows up the next day, they pull my files out of the computer, check them over—they have certain standards I must work up to—and then they cut 'em up, put them in Federal Express, and, boom, I've got them generally in 48 hours."

RESOURCES:

Envision Design Centers, Inc.
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(415)434-8800

Scale Models Unlimited, Inc.
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Menlo Park, CA 94025
(415)324-2515

BEYOND ARCHITECTURAL APPLICATIONS

Although architectural model making is the LaserCAMM's bread and butter application, many novel uses for its services have been discovered by a broad range of clients. From sign making to etching circuit boards to cutting stencils, product models, and prototypes, new applications for the LaserCAMM and CAD are always popping up.

Marie Cortez of San Jose-based CADence Design Systems discovered that lasercutting could help her pull off an unusual event celebrating her company's merger with Valid Logic. She wanted to "do something symbolic, that was interactive, that would get all of the employees involved." Her idea was to have the 1300 Bay Area employees of CADence and Valid put together a large puzzle.

An artist designed "a picture of the world with our logo on top with the words, 'The worldwide leader' under it. In the very background, very subdued, it said, 'Now we're one.' San Jose Blueprint printed the artist's design and mounted it on twelve foam board panels with 128 pieces per panel—over 1500 pieces," Cortez explains. "Envision then took the panels and came up with the puzzle design and made the cut. They also helped us number all the panels to correspond to the baseboard we we're going to mount them on."

The puzzle was replicated in smaller versions for two other CADence sites, so altogether Envision cut three puzzles. The whole lasercutting process took about five days.

The LaserCAMM has also gone to Hollywood, having cut the parts for a model blimp used in the film, *The Rocketeer*, and props for *Ghost* and *Back to the Future II* and *III*. In *The Rocketeer*, the laser was used to cut the plywood pieces for the skeleton of a 34' scale model of a dirigible called the *Luxembourg*, a blimp modeled after the famous *Hindenburg*. In the climactic scene of the movie, the *Luxembourg* blows up and burns just as the supposedly indestructible Nazi airship did in 1937.

Although architectural model making is the LaserCAMM's bread and butter application, many novel uses for its services have been discovered by a broad range of clients.

New applications for the LaserCAMM are bound to be thought of as CAD-driven laser cutting is discovered by more people. But even if no more uses are found for the laser cutter, the mark it has made on the world of architectural model making easily justifies its existence. Not bad for an invention that just a few years ago was a figment in the mind of a frustrated model maker. ■

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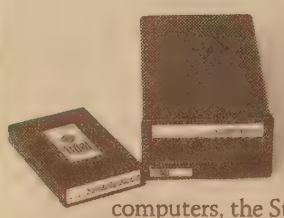

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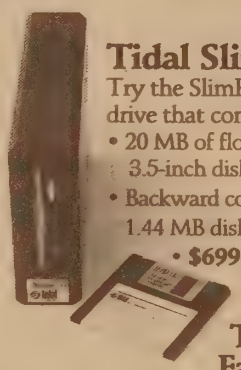

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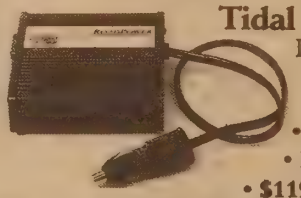

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"BEST SCALABLE CARTRIDGE FOR THE HP LASERJET III"
PC Magazine

Sensational!

There's no better word to describe IQ Engineering's two new **scalable** font cartridges for all HP LaserJet® III printers. The new Super Cartridge™3/*Professional Edition+* and *Creative Collection* have the **largest variety** of scalable typefaces available—at the most competitive prices. With 66 fully scalable typefaces and fonts on the *Creative Collection* and 72 on the *Professional Edition+*, each has **more** typeface selections than any other font cartridge on the market. With list prices of just $395 each, that's under **$5.99 PER TYPEFACE** —less than most soft fonts!

SELECTION: PC Magazine named the Super Cartridge 3/*Professional Edition* "the **best** scalable cartridge for the HP LaserJet III." With IQE's high quality output, it's easy to see why. You can be **creative** with the *Creative Collection's* 22 great display faces like IQE Copperplate, Champs Élyseés and **Bodoni Poster** plus 44 text fonts like IQE's Goudy OS, Letter Gothic and Souverin. The *Professional Edition+* essentially gives any HP LaserJet III family printer twice the number of typefaces available on most **PostScript**® printers, including equivalents for the 35 standard PostScript faces. With preferred serif faces like IQE's Schoolbook and Garamond OS, decorative fonts like English Blackletter and *Chancellory*, and scalable "fixed pitch" Prestige Elite and Courier, the *Professional Edition+* has an unequaled **ASSORTMENT** of typefaces. It even has small caps and old style figures—fonts not available on any other cartridge. And since each Super Cartridge 3 product has a **unique selection** of fonts, you can use both or pick the one that best suits your needs.

FEATURES: IQE's Super Cartridge 3 products' unique features are clearly **unmatched** by any other font products. Each contain PostScript compatible font spacings for Type 1 & **Linotronic** compatibility. Both have scalable fixed pitch fonts for spreadsheets & tables, and they can both access 39 different symbol sets simultaneously. They're also the only cartridges to come with **free** ATM® and HP Intellifont® Windows screen fonts, (a $199 value).

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Manufacturer / Product Name *(All compatible with LaserJet III, IIIP, IIID, IIISi, Brother HL-8V)*	*Number of Scalable Typefaces*	*List Price*	*Price Per Typeface*	*Number of Type Families*	*PostScript Compatible Font Spacing*	*Fully Scalable "Fixed Pitch" Typefaces*
IQ Engineering Super Cartridge 3 Professional Edition+	72	$395	$5.49	20	YES	YES
IQ Engineering Super Cartridge 3 Creative Collection	66	$395	$5.99	31	YES	YES
IQ Engineering Super Cartridge 3 Professional Edition+ & Creative Collection Bundle	138	$745	$5.40	51	YES	YES
Pacific Data Products™ Complete Font Library™	51	$399	$7.82	15	NO	NO

Super Cartridge™

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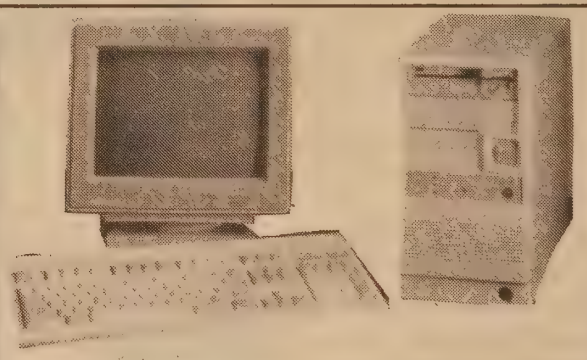

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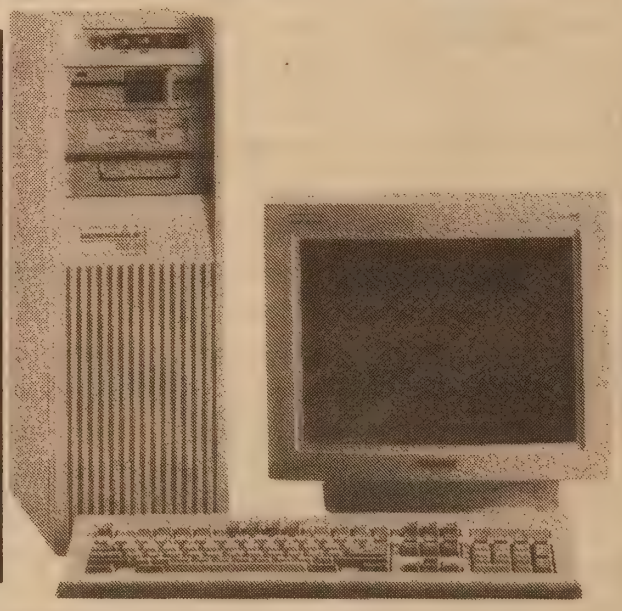

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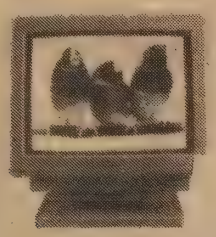

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KX-P1524	24 pin	240cps	132 col	329
KX-P1695	24 pin	330cps	132 col	359
KX-P2624	24 pin	300 cps	136col	389
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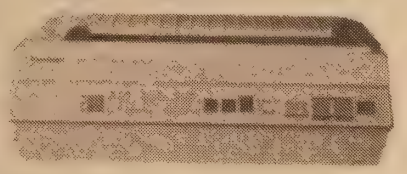

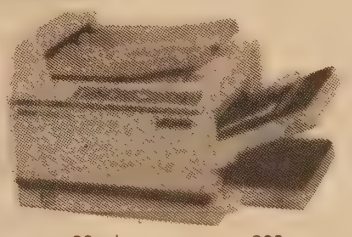

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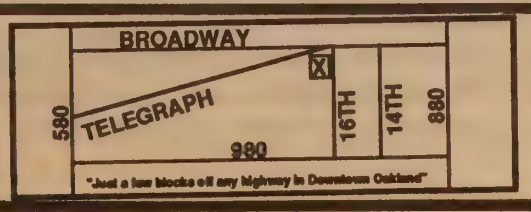

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Building A Hybrid Network With 10BaseT

Part 2

BY WAYNE A. YACCO

A lot of big installations are using MiLAN's Alternet to keep their networks from turning into the Gordian Knot of cabling. As I promised last month, this column continues with the details on Alternet, and the explanation of how retiming limits the number of concentrators and other repeaters on a network.

THE PROBLEM REPEATERS SOLVE

Repeaters provide a simple way to join segments into larger ones. They increase the size of a segment by renewing packets of data, and passing them along. To renew packets, repeaters boost signals, and they retime them. They retime signals to prevent jitter (which is the phenomenon of packets moving "out of frame," or arriving a little earlier or later than they should) from accumulating over multiple segments. If these timing errors were allowed to accumulate, it would quickly become impossible to distinguish between zeros and ones.

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THE PROBLEM REPEATERS HAVE

Retiming, though necessary to correct jitter, also introduces delay. The delay is what limits the number of repeaters that can be cascaded. The total number of repeaters between the two most distantly separated nodes on an Ethernet network must not introduce more than ten microseconds delay (the end-to-end transmission delay).

Within a segment, the number of devices that are allowed depends on the speed with which they perform their retiming chores; that limit is referred to as the "repeater budget." "The rule of thumb is no more than three levels of repeater cascading," says MiLAN's marketing director Dan Eakins. "After that you need a bridge." (Bridges correct the delay by isolating the timing of the segments they join.) The documentation for Shiva's Hublet (see last month's column) suggests that four repeaters is the outermost limit with today's technology.

All varieties of Ethernet require repeating if the length or capacity limits on a segment are exceeded. For instance, thinnet's overall limits are 185 meters and thirty nodes, and the maximum distance between node pairs is 50 meters. To go beyond that, you need a repeater to boost the signal. Hubs are simply multiport repeaters, and they repeat the signal from each node's segment before passing it on to its destination segment. The restrictions that apply to cascading, or interconnecting, of hubs on 10BaseT are, therefore, the same ones imposed on any repeater.

THE CHEATER REPEATER

As I mentioned last month, it is possible to directly convert thinnet to UTP with a gizmo made by MiLAN. Alternet turns thinnet into UTP like a concentrator does—by repeating its signal. However, it lacks a real repeater's retiming circuitry, and won't use up any of the repeater budget. Of course, that makes it likely that jitter will accumulate if two Alternets are connected back-to-back (except over very short wire runs). But within its two-segment limit, Alternet is a simple and inexpensive solution.

Alternet works, says MiLAN Marketing Manager Dan Eakins, because every 10BaseT segment normally goes right into a concentrator, and a concentrator's retiming corrects the segments plugged into them. "The IEEE says every time you extend or convert media, you have to retime it, but with 10BaseT, every hub is already doing the retiming," claims Eakins. "So, you don't have to retime just to repeat between two segments if one is connected to a hub."

He says the IEEE spec is less tolerant because it was written for thicknet, not 10BaseT: "The IEEE has not recognized that jitter is a different problem than it was ten years ago." Some very connectivity-savvy companies have apparently recognized the difference. Eakins says some have ordered over a thousand Alternet converters.

So, although it doesn't conform to the IEEE Ethernet spec, Alternet works fine, because it's connected to a hub, and the hub corrects

More-Twist is a 10BaseT extender that can add an extra hundred meters, doubling the length of 10BaseT segments. Like Alternet, it does not correct timing, but it doesn't reduce the repeater budget either. If you put one between every repeater, it could effectively double your budget.

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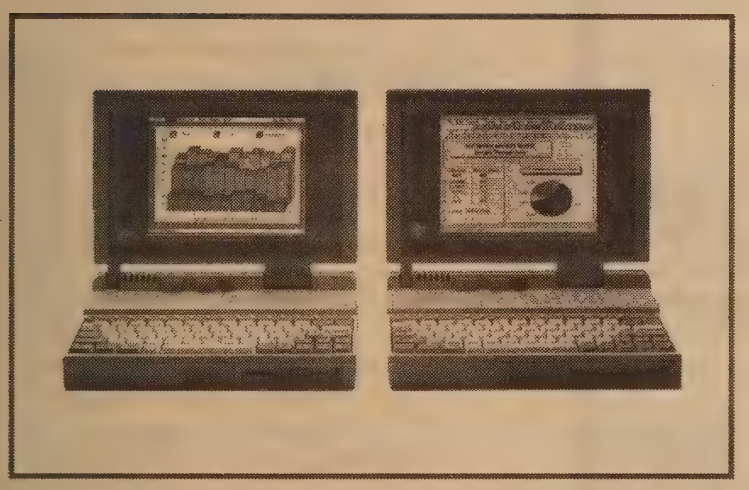

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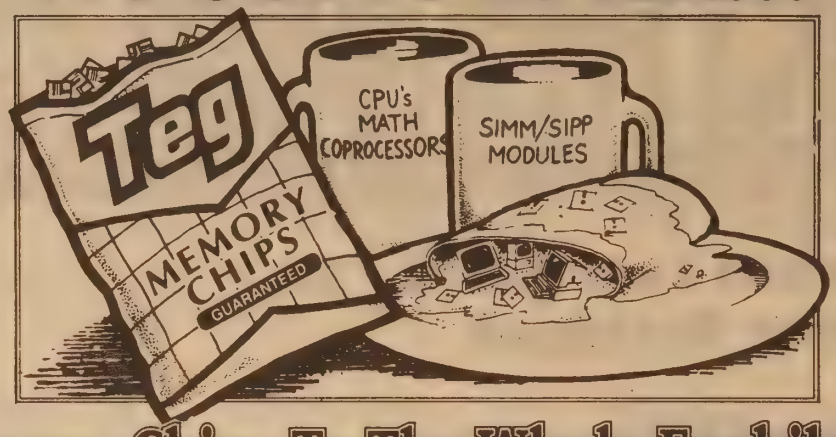

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If you're involved in the movement of desktop publishing and related graphical applications, to the group-production metaphor of turnkey publishing systems, the Mobius Ethernet Display System represents major progress in that direction.

the jitter before it becomes significant. MiLAN makes gadgets that will take you almost any-Ether-where with this design. More-Twist is another useful example: a 10BaseT extender that can add an extra hundred meters, doubling the length of 10BaseT segments. Like Alternet, it does not correct timing, but it doesn't reduce the repeater budget either. If you put one between every repeater, it could effectively double your budget, and that's something you can put in your repeater pocketbook.

Next month, I'll look at another hybrid-network product: one from Tutankhamon Electronics that was developed specifically to overcome Ethernet limitations. The king's minions say it increases reliability and distance while reducing the required number and quality of wire pairs!

DOING THE MOBIUS STRIP

If you're involved in the movement of desktop publishing and related graphical applications, to the group-production metaphor of turnkey publishing systems, the Mobius Ethernet Display System represents major progress in that direction. Now, these applications can have their Ethernet for the price of a single NuBus slot. Mobius makes models for not just NuBus, but for LC and

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SE/30 systems as well.

With only a single slot available in either, the LC and SE/30 have the most to gain. But the compact Mac machines, while great for saving space on the desktop—not to mention saving a few bucks—put the squeeze on you, too, when it comes to expansion. I also work with an IBM PS/2 model 80 and several AT compatibles, and I've managed to feel cramped even with eight slots. It reminds me of the adage that says work expands to fill the available time. Perhaps, there should be another adage that says expansion needs grow to fill the available space.

Of course, networks add to the bus crush by adding another card to every machine. So, I was really delighted when Mobius sent one of their NuBus systems for the IIcx I use. Mobius basically put a video controller on a network interface card (NIC) with both thin and twisted-pair Ethernet connectors. I simply stripped the old cheaper-net out of the cx, popped in the Mobius adapter, swept some stuff off a shelf, and replaced it with the Mobius 19" monochrome monitor. Since I didn't have to give up a slot, the system's NEC 4D continues to provide low-cost color. The Mobius display adds enough space to open many additional windows. More importantly, however, it gives you access to very large windows. You can use it for side-by-side documents.

Mobius makes it easy to install and use the Ethernet Display System. Support is fairly busy, but toll free (and they do call back). The documentation is well illustrated, and the installation software includes EtherTalk Phase 2, an Ethernet driver for the display system, and AppleTalk 56.0. A single jumper must be set to select between the RJ-45 connector for 10BaseT and the BNC connector for Ethernet. (A pair of external lamps confirm the type and connection status at a glance.) The Mobius Installer did assume that its was the only display and reset my color, but a quick trip to the Control Panel had it back in a click. One boot later, and I was whipping the cursor up and down between screens like a maniac. Hey, it's fun.

It's fun to use too. I've worked with an MDS Genius full-page display on PCs, and it's great. However, the Mac adds an extra dimension, not merely because it displays pages side-by-side, like they'll appear when printed, but because you can move windows between them without special support in the applications. In fact, you can drop a window right on the border with half hanging in each display if you want.

For instance, by designating Mobius as the primary display (you merely drag the title bar to it in the control panel), it is possible to make PageMaker fill the entire screen with two full-size pages. It then takes but a single click of the mouse to simultaneously move the screen to the color monitor, and resize it to fill the smaller screen exactly. You can do layout on the Mobius with full view of tracking and dynamic balance across a complete spread, then instantly switch to the 4D to work on separations or other color detail.

The Mobius Ethernet Display System really helps Mac users add another term to the group-publishing equation. It costs a fraction of what two-page color would cost, and it includes an NIC. Furthermore, the monitor is significantly smaller and lighter than a color unit of the same dimension. It's easy on the eyes too: The resolution is 1024 x 826 (75dpi), and it has a 75Hz vertical refresh rate. For more space on your NuBus, more space on your Mac desktop, more space on your hardwood desktop, more space on your network, and more just-plain personal space, this is the way to go. Wow, I'm spaced out. ■

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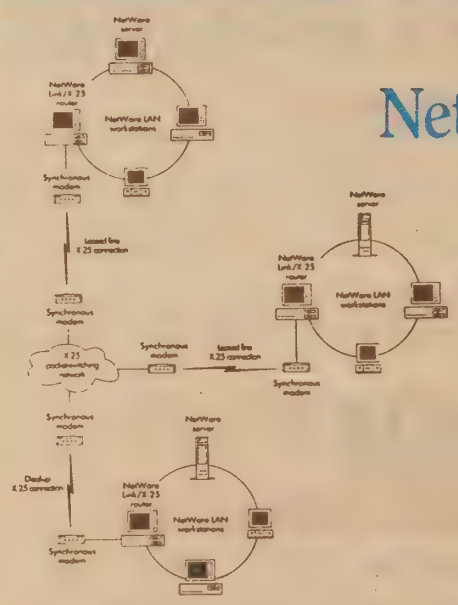

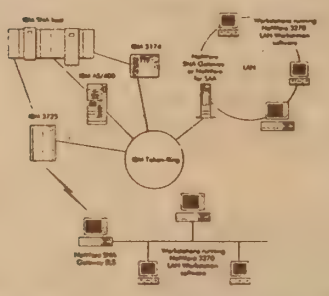

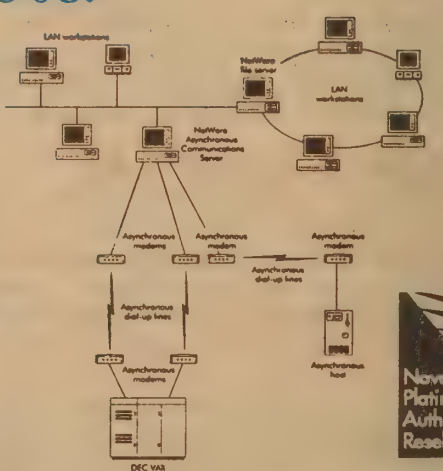

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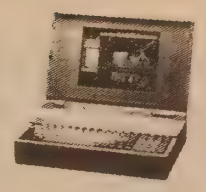

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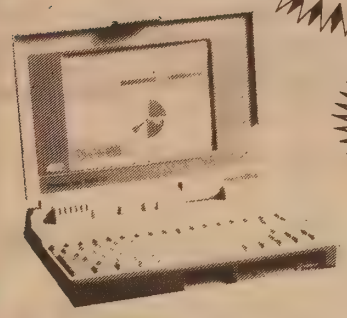

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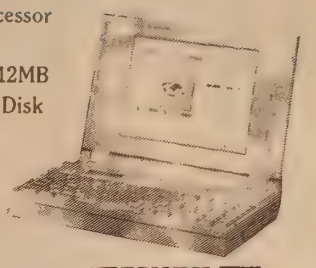

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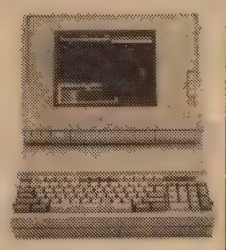

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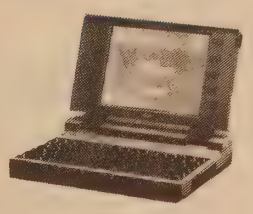

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The Paradox Of Performance

Lunch With The Gurus

BY BENNETT FALK

UNIX

The gurus, in sun hats and dark glasses, were seated around an outdoor table at a restaurant in Emeryville indulging their fondness for radicchio and Chardonnay. The waiter had just begun pouring another bottle when someone's beeper went off. The diners looked at their waistlines and then at each other until the guilty party was found.

The bearded Baba poked at the little black box attached to his belt and squinted at the number displayed there. He reached into his jacket pocket, pulled out a small cellular phone, and dialed a number.

"Yo, what's up?" he asked presently. Conversation around the table stopped while the bearded guru talked on the phone.

Aware that he was the center of attention, he covered the mouthpiece of the phone and explained to the other gurus: "They're putting me through to somebody reporting a performance problem with an application program, a database of some sort."

ILLUSION? PERHAPS...

The waiter, a balding penguin-shaped man in black trousers and white shirt, cleared his throat and ventured a comment. "Has it ever occurred to you that the vagaries of computer performance are illusory?"

All the sun hats and dark glasses turned to face the waiter, taking in his perfect posture and excessive decorum. He continued:

"Put simply, any computer consists of three parts: a processor to execute commands; some amount of memory that serves as high-speed, short-term storage for the processor; and some amount of disk storage which holds larger volumes of data on a medium much slower than memory. Each of these components has a fixed speed; that is, each component can do only so much work in a millisecond or a second or a minute, and in fact, unlike a car or a human being, each component always works at its designated speed. It has no choice. Strictly speaking, the computer's performance is constant.

"On occasion, the performance of a program on a computer may vary from one running to the next, but this is not because the disks, memory, and CPU run slower at some times and faster at others. Since the computer's speed is fixed, I suggest the apparent variations in the running of programs are nothing but an illusion."

Copyright © 1992 by Bennett Falk. All rights reserved. *Bennett Falk lives in the Bay Area, writes when he can, and hopes for the best. He works for Sybase, but the opinions and attitudes expressed are his own.*

YES, BUT...

Baba, still holding the cellular phone, peered over his sunglasses at the waiter. "I suppose," he said, "that if your program ran on a single-user computer incapable of multitasking, the performance of the program would be more or less identical with the performance of the computer. Both would be constant, and you might be less sensitive to performance variations.

"But in a multiuser situation the performance of a single program can suffer because the computer's resources are shared among all the users at any given time. The degraded performance has one easily measured symptom: the program takes longer to run. The elapsed time for a program stretches out as it competes with other programs for CPU or memory or disk. It certainly doesn't seem illusory to me."

The waiter was unmoved. "Of course it doesn't *seem* illusory, but is it not the case that when a program takes longer to run, it is because *more* work is being done, either by the program being measured or by some other program running at the same time?"

"On occasion, the performance of a program on a computer may vary from one running to the next, but this is not because the disks, memory, and CPU run slower at some times and faster at others. Since the computer's speed is fixed, I suggest the apparent variations in the running of programs are nothing but an illusion."

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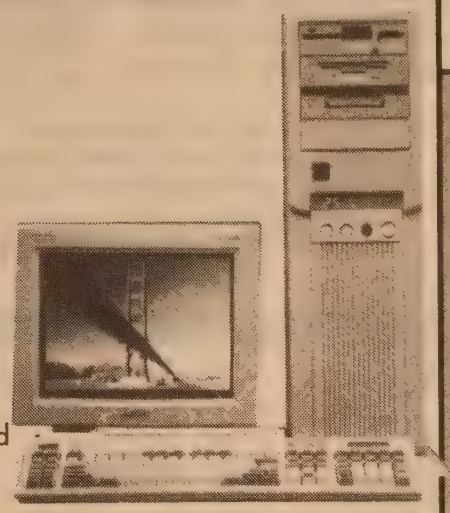

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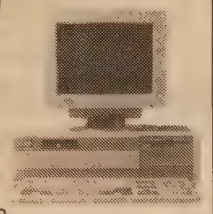

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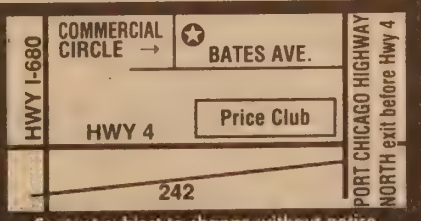

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"Not necessarily," chimed in another of the gurus. "What if there's a bottleneck?"

"Bottleneck?"

"Yes, bottleneck. You described a computer with three parts: processor, memory, and disk. What if one program used so much of one of those resources that no other program could proceed? There's a good chance that whoever is on the other end of Baba's phone will report that they have one process using up 85% (or more) of the processor's cycles and no one else can get any work done. Surely that's a performance problem."

"Don't most people avoid bottlenecks by doing something creative with hardware? The simple solution is to add more disk, memory, or processing power. But even without adding more hardware, there are clever ways to convert one hardware resource into another."

"Well, that might be a scheduling problem, but since the machine's performance has to be constant, I'm not convinced it's really a performance problem."

The waiter slipped into a more relaxed posture. "In fact, look at the kinds of things that are done to relieve bottlenecks. Don't most people avoid bottlenecks by doing something creative with hardware? The simple solution is to add more disk, memory, or processing power. But even without adding more hardware, there are clever ways to convert one hardware resource into another. When the demand for memory exceeds what is physically available, disk space can be treated as an extension of memory and whole processes are swapped back and forth between memory and disk. Similarly, material read from disk is often buffered in memory to save on time-consuming disk accesses.

"Regardless of how we divide things up, however, any particular hardware configuration will always run at only one speed."

THE PERILS OF IDLENESS

The bearded Baba sighed heavily. "This business about the machine running at a fixed speed is bothersome. Maybe you don't have to shift gears on your computer to get up to speed, but there's a big difference between running at a fixed speed and running at capacity."

"Oh?" the waiter arched an eyebrow. "And what might that be?"

"Well, technically," the bearded guru continued, "it's the percentage of time the disk or the CPU is idle. Take the disk, for example, it's either doing something or it's not. If there's nothing that needs to be read or written, we say the disk is idle; when there are lots of read or write requests, there may be long periods of activity between spurts of idleness. In general we can measure (with UNIX commands like 'iostat' or 'sar') how much time a disk spends being busy or idle, and we can turn those measurements into a percentage of the disk's capacity.

"You've already pointed out that the disk can't exceed its capacity, so when the disk is already working at capacity and we ask it to do even more, it will just take extra time to process all the requests."

At the other end of the table, another of the gurus became agitated and started babbling about "head contention on a hot spindle." A distinguished-looking man at a nearby table glowered disapprovingly at this outburst and tried to signal the waiter, who ignored both these distractions and addressed the gurus nearest him:

"But surely this proves my point that variations in performance are illusory: the 'percentage of capacity' measurement depends entirely on the period of time over which capacity is measured. If we were to measure the performance of a disk once a second and if the disk were busy for one second and idle for four, what percentage of capacity should we assign to that? From the fact that at any given instant the computer is either doing something or doing nothing you want to infer performance gradations. But the gradations all depend on the time period over which you take measurements. How can you trust anything so, well, malleable?"

"Hello, Hello," a tiny voice buzzed from the speaker of the cellular phone.

The bearded guru put the phone to his ear and listened for a few seconds, periodically making noises indicating comprehension. "Have you considered the possibility," he said, "that this might be an illusion?" ■

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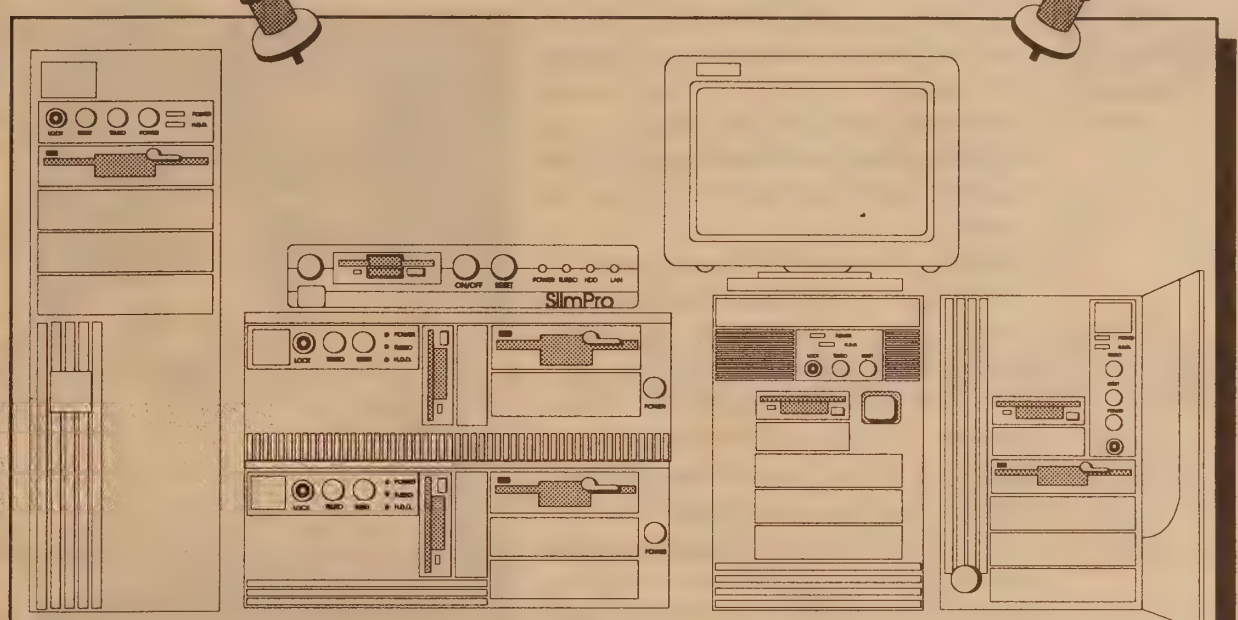

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An Interview With John Walker

BY MARY EISENHART

Look around this room. Other than people and plants, this room and everything in it was designed and manufactured. Today, despite all our progress in computing, the process of architectural and engineering design and manufacturing is done much as it was fifty years ago. All of this is about to change.

In the largest companies, you can see glimpses of it already, but, as with the first computers, the benefits have not yet entered the mainstream of the economy. That is the work before us.

The basic trend that drives this industry—the fact that every eighteen months the computer power available at constant price doubles—continues intact and may even be accelerating.

Soon, millions of designers around the world will possess the tools that empower them to design the products of the next millennium. In the United States alone, there are more than six hundred thousand manufacturing organizations. Eighty-five percent employ ten people or less. The revolution in design and manufacturing that is about to occur will change the way we conceive and construct every artifact of humanity.

This is not a small market, or one in danger of "saturation." Its size is constrained not by economic forces so much as the availability of computer power and the creativity of the human mind. The first is growing exponentially with no end in sight. The second knows no bounds.

—John Walker, Remarks for the Windows Press Conference, March 10, 1992

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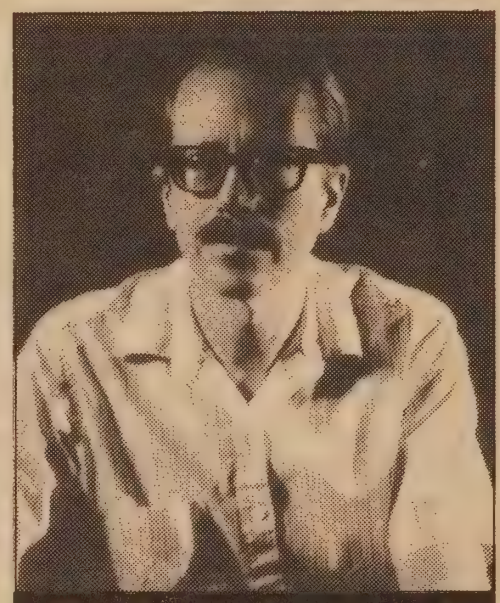

We've changed the way we write because we have word processors. We haven't changed the way we manufacture because we have CAD yet.

"Should I sing the Mel Brooks Inquisition Song now?"

John Walker looks on with horror as the equipment cases disgorge cameras, lights, and other instruments of torture, clearly destined to be used on him. It is perfectly obvious that when he turned the presidency and chairmanship of Autodesk over to Alvar Green some years back, this was the exact sort of thing he was really looking forward to avoiding.

What Walker likes is some peace and quiet in which to write code, something that falls within his job description as programmer at Autodesk's European technical center in Neuchatel, Switzerland. He is, by general agreement, one of the best programmers alive today, to the great benefit of the company's product line. But for the last six months or so, peace, quiet, and Switzerland have not figured prominently in his life.

It all started with Information Letter #14.

Information Letters are a fine old Autodesk tradition. The first twelve (there is no #9) appear in *The Autodesk File*, a collection of internal documents Walker assembled and published in 1988. Most of them were written in the first year of the company's history, as Walker and his fifteen cofounders (who all, as Walker said, would rather write a book than talk on the phone for ten minutes) kept each other informed through startup and success. Eventually they became company-wide bulletins. IL13 contains Walker's thoughts on leaving the chairmanship and returning to programming, along with reflections on the company's future.

While "explaining Autodesk" is one of those endeavors absolutely guaranteed to lead to catastrophic oversimplification, *The Autodesk File* (1988, New Riders Publishing, ISBN 0-934035-63-6) is as good an introduction as you're likely to get, and reveals an ethos as deep, complex, elusive—and strongly held by its founders and employees—as The HP Way at Hewlett-Packard.

In "The New Technological Corporation," a 1988 paper in which he suggests that Autodesk represents a new type of business and discusses the strategic implications of that fact, Walker illustrates a point with the following quote:

"Every heat engineer knows he can design his heat engine reliably and accurately on the foundation of the second law [of thermodynamics]. Run alongside one of the molecules, however, and ask what it thinks of the second law. It will laugh at us. It never heard of the second law. It does what it wants. At the same time, a collection of billions upon billions of such molecules obeys the second law with all the accuracy one could want."

—John Archibald Wheeler

Walker was talking about economics at the time. However, it isn't completely inaccurate to perceive Autodesk as an ordered universe of some very independent-minded molecules, either.

A conscious goal of the founders, aside from taking advantage of the software opportunities generated by the PC market, was to create the kind of company they

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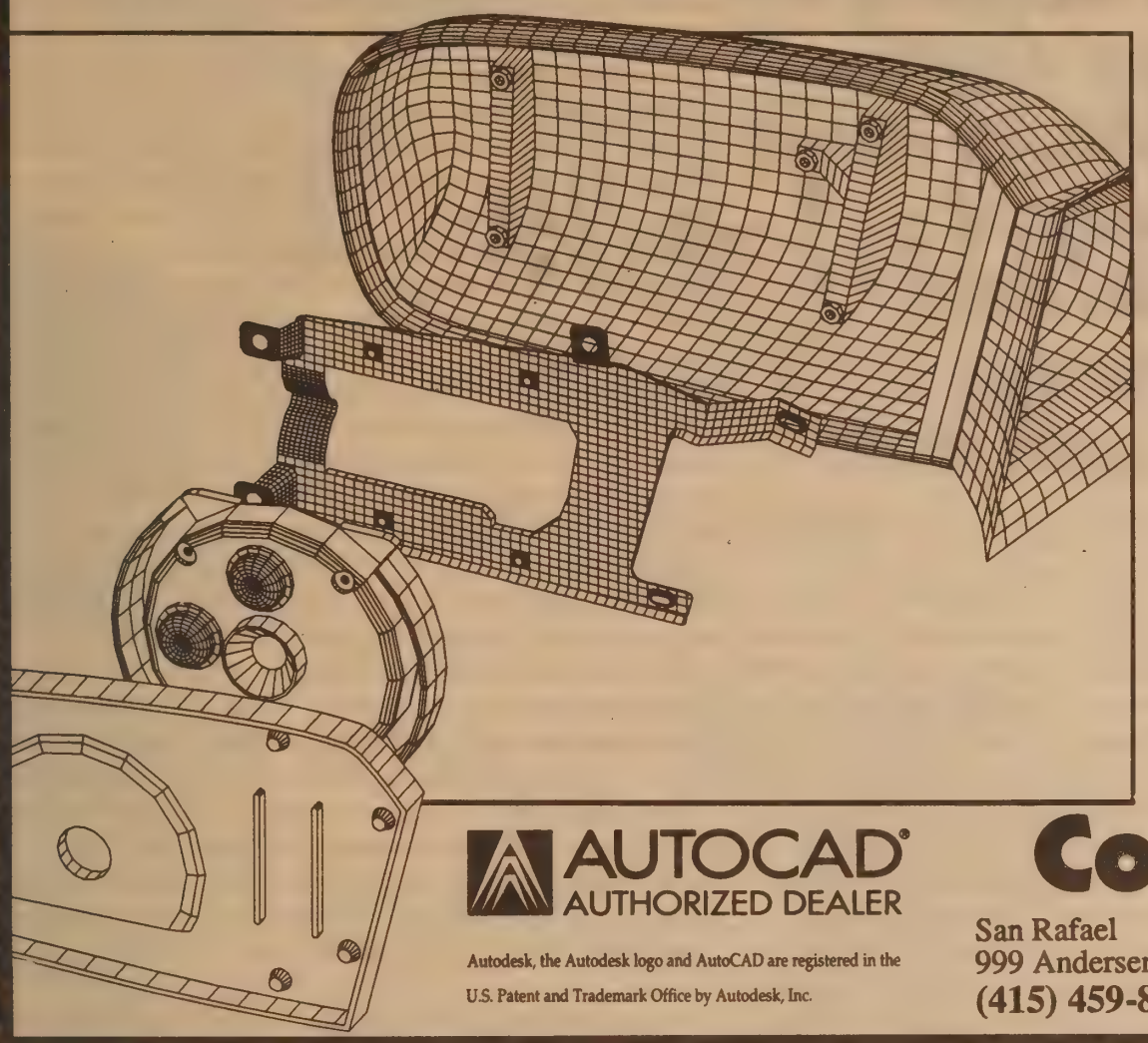

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We have a tendency in this business to view competition as some kind of a zero sum game. It's not a zero sum game at all. This industry didn't exist in 1976. It all came from nowhere. And a lot of additional things are going to come from nowhere over the next three years, five years, ten years.

wanted to work at. Many of them still do, and founder/programmers Dan Drake and Greg Lutz serve on the board of directors. As a 1986 recruiting ad said, "We couldn't find a company like this one four years ago, so we built one to our specs. Maybe they'll be your specs too."

But the creative freedom dear to the hearts of hackers was balanced by a lot of common-sense pragmatism. As Walker says, "Any business that isn't interested in meeting the needs of people in the real world is somebody's personal playpen and not a business. You've got to be customer-oriented. Every business is a service business. I believe that firmly, that fundamentally when you ask somebody to give you money, you have to be giving that person something that is more valuable to them than money."

Back in 1982, the founders had no clear idea of the company's direction, beyond the knowledge that they were going to write and sell software. They prepared five prototype products, including an office-automation program called Autodesk, a database based on the public-domain JPLDIS language that's the foundation of dBASE—and a rewrite of a drawing program called Interact, written by founder Mike Riddle. They called it MicroCAD and took a demo to the 1982 West Coast Computer Faire. It was a hit. They put all their resources behind it. They renamed it again—AutoCAD.

AutoCAD, for the first time, made it possible to do computer-aided design and drafting on a personal computer. Since this was previously the exclusive and expensive province of mainframes, it created a sizable market. The company grew and prospered.

By 1986 Walker decided the company needed his programming skill more than it needed him as an administrator, and passed the presidency to Alvar Green. A couple years later, he also resigned as chairman, the better to develop software in peace. In 1990, he moved to Europe.

In 1988, the company was involved in developing a wide range of projects, including Ted Nelson's Xanadu hypertext publishing system, a virtual reality interface called Cyberspace, a molecular modeling package called HyperChem, and an online information system called American Information Exchange (AMIX), in addition to ongoing work on AutoCAD and its many enhancements. By 1991, the company was still prosperous, but funding for most of these projects was gutted, employees were leaving, customers were complaining, and analysts were questioning the company's long-term viability.

Which brings us to Information Letter #14, better known as "Autodesk: The Final Days." On April 1 of last year, Walker distributed IL14 throughout the company's electronic mail system. For good measure, he left paper copies on a few well-chosen chairs.

"In the early days of Autodesk," he writes, "I wrote status reports on the progress of the company for employees and shareholders (who were, at the time, the same people). These papers chronicled the triumphs and disappointments, the crises and their resolutions, which are part and parcel of building a company. It's been years since I brought my view of the company to you in this way; since I removed myself from management in 1988 I've been concerned primarily with software development and identifying technical directions in which the company should move, not commenting on where it was going or how effectively it was getting there.

"But now I feel compelled to speak out. I believe that our company is entering a time of great peril combined with unparalleled opportunity. Regrettably, I do not believe that Autodesk's management is positioning the company to emerge from this period stronger and better equipped for future growth. Indeed, it is my opinion that their current policies place at risk everything we have achieved since 1982."

Information Letter #14 became one of the most-discussed documents in the history of the personal computer industry. Its most famous section described a nightmare scenario in which Microsoft's Bill Gates decides to go into the CAD business and ships a slick, state-of-the-art, Windows-capable package that completely outclasses the Windows-incapable AutoCAD. (The document received even wider circulation when Gates quoted from it in his own much-leaked internal memo "Challenges and Strategy" the next month.)

Information Letter #14 paints a dire picture of projects derailed by lack of investment (in one instance, Walker points out, Autodesk finally decided to spend some money on advertising a new product after he volunteered, in exasperation, to buy the ads with his own money), with much ensuing brain drain to rival firms, low morale among the developers who remained, and customer dissatisfaction at slow response to their changing needs. It characterizes the flagship product as outmoded (a features comparison with CorelDRAW! is especially scathing) and overpriced. It concludes with a rousing call to action:

"If this message is understood and accepted, then the next few weeks should bring the first signs of change. In a few months, the first evidence of the new Autodesk will begin to appear on the marketplace. Things will start to get better. It will be obvious to everybody that Autodesk is again on the move, that the spirit, the confidence, and the energy that vaulted Autodesk into the front ranks of software companies in 1983 and 1984 is now, in the early years of this new decade, carrying Autodesk further, toward leadership among the next generation of software companies.

"If management does not act, this too will become obvious. It will be reflected in falling sales, declining profits, eroding market share, and eclipse of the company as an industry leader—loss of the ineffable sense that here is where the future is being built. If this happens, we will know what opportunities were squandered at the very moment Autodesk held the future in its hands, and we shall never forget."

The last few months suggest that Autodesk is coming out of the doldrums. Walker returned from Switzerland for a six-month visit, assuming the temporary title of manager of technology and taking an active part in the search for a new CEO/chairman to replace the retiring Green. In the spring, back-to-back rollouts of AutoCAD Extensions For Windows and the molecular modeling package HyperChem took place amid assurances that over two dozen more products, including the long-deferred Cyberspace and AMIX, would appear before year's end.

As we go to press, Autodesk has just announced the appointment of Carol Bartz, a vice president from Sun Microsystems, as Autodesk's new CEO and chairman. Walker is back in Switzerland, where we'll probably be hearing more from him. For one thing, he's got another book on the way: *The Hacker's Diet: How to Lose Weight and Hair Through Stress and Poor Nutrition.*

At the press conference, Walker professed himself well pleased with the arrival of Bartz and the company's state as it entered its second decade. "These are not our final days," he said. "This will be our finest hour."

This interview took place about two weeks earlier.

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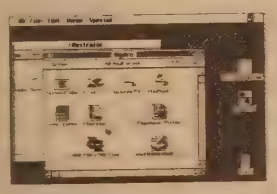

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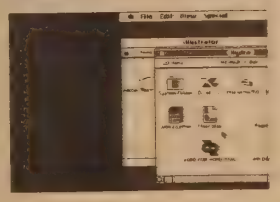

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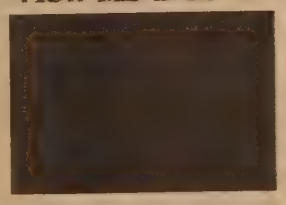
View MS-DOS



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It would be more standard, at this point in a company's evolution, for somebody in your situation to have washed their hands of it and walked away. You seem to be doing rather the opposite—while not being chairman, not being president, and categorically denying that you're calling the shots, you nonetheless seem to have a pretty strong interest in Autodesk's direction. Why are you doing this, instead of going back to Switzerland and doing something else?

Well, I guess you have to ask the question "Why do people wash their hands of companies?" If you get fired, that's a pretty straightforward case. There's the case where you conclude that "the company wants to go this way, I want to go that way."

Those are all things that I've certainly thought of many times. I'm always constantly reevaluating everything.

Basically, where Autodesk should be going is where I want to go personally. And as long as I can persuade Autodesk to go in that direction, I consider that my efforts are more useful, more effective, leveraged by having the resources of a company like Autodesk going my way, than they would be off by myself in my pump factory in Switzerland.

What I intend to spend the next five years of my life doing is working on automated manufacturing. I'm certainly planning to be doing that in my capacity as a programmer at the European technical center of Autodesk. If Autodesk recruits a new CEO, and the CEO's first act is to fire me, I'm going to spend the next five years of my life automating manufacturing anyway, okay?

It's what I want to do, and I believe it's the most important thing I could do for Autodesk. And that whether I do it or not, it is something that Autodesk has to do if Autodesk wishes to remain the strong force in the CAD business that it now is, because that's part of where the CAD business is going.

Coming over here entailed sacrificing a large amount of what I've spent the last five years of my life trying to achieve, in terms of having a low profile, in terms of not being identified with the company. Throwing that away, I've lost a large part of my life, and it's not clear that it's retrievable, at least not without another four or five years. I guess that's an indication of how much I believe in what we're doing here, in what we're attempting to do, and how much I believe I could contribute to achieving that.

You've defined what you think Autodesk should be doing. What other likely directions do you see for it?

I think you have to take an appropriately long view of the context we operate in. We are in several businesses, which I don't think you could find any competent thinker who would not believe are going to grow very, very rapidly over the next twenty, thirty, fifty years. If you are in a business like that, then you have to be a competitor who is constantly concerned about how much of that business is yours.

I believe that however you define market share, having the largest market share in the CAD business is an asset that is measured in the hundreds of billions of dollars over the next fifty years. I believe that having a commanding market share in desktop video is an asset that will be worth hundreds of billions of dollars over the next fifty years. Similarly you can just line these things up.

Now if a company focuses too much on the short term, on the margins this quarter, the margins over the next year, and sacrifices market share, that's a bad business decision. That is squandering an asset of the company for a near-term benefit. That's not in the long-term survival interest of the company.

I think we have a tendency in this business—perhaps it's educated in business schools—to view competition as some kind of a zero sum game. It's not a zero sum game at all. This industry didn't exist in 1976. It all came from nowhere. And a lot of additional things are going to come from nowhere over the next three years, five years, ten years.

When you have a success, it's easy to assume that 1) it can go on forever, and 2) that that's all you need to do. I look at Autodesk, and I look at our rate of growth, and I look at Microsoft's rate of growth. I look at Borland's rate of growth. I look at the other players in this business, and I prefer not to think of it as a predator/prey relationship, but rather colonies of bacteria in a Petri dish. If one is growing at 75% a year, and the other is growing at 15% a year, then before long you tend to end up with all of #1. Not that #1 even bothers to devour #2, but rather that #2 is sufficiently irrelevant now that it just doesn't matter.

That's what really happened with Autodesk in competing with the major mainframe CAD vendors for the drafting market. We didn't really take seats away from them—most of the companies that had those mainframe systems still have them, in fact have more of them. What happened was, we created an entirely new market for CAD that was the other 98% of the business they weren't selling to, and that's where the growth came from.

I believe that that's what you have to do. I think it's crazy to say that the CAD market as it exists today is all there's going to be in CAD. In the *really* long term there isn't going to be drafting. But I think getting rid of it is going to take a lot longer than a lot of people believe.

It's a highly effective form of communication. It's a form of communication that is so evolved after thousands of years that it challenges the designer of the CAD system to better it. I can literally get a napkin, and about that fast, make a drawing that I can hand to a machinist who can hand me a part, with tolerances of a thousandth of an inch, to my specifications. Block, circle, just draw the dimensions, it doesn't have to be precise—that person will manufacture it for me. If I were to sit down today using the best solid modeling systems in the world, it would take me a comparable amount of time to build a model of that object as it takes the machinist to make it. Now if I'm the designer, which am I going to use? If I can scribble down a couple of lines and give it to some guy, and he goes off and does it, why should I manufacture the part myself so that now it can be manufactured?

That's the challenge we have. We've changed the way we write because we have word processors. We haven't changed the way we manufacture because we have CAD yet. That's not going to happen in five years. It's going to start to happen in five years. In isolated places you can see it now. In the very high-end military systems they're building fully faithful 3-D models of the objects before they're ever assembled, they're doing automated manufacturing takeoff from these models, and on a project the scale of the B-2, they save money doing it. But for that technology to filter down to the machine shops, most of which are very small and don't have a large capital budget, is going to take a long time. And it's going to take pushing.

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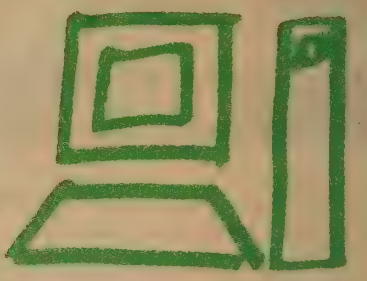

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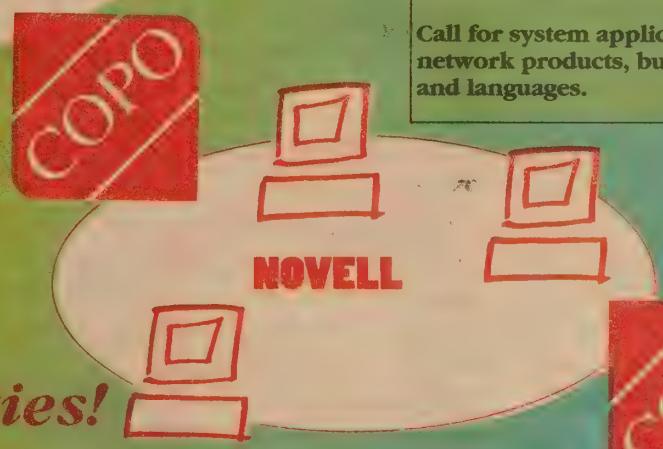

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Once something is in the box, the software will appear. People will start to use it. And I think we're really getting to that point on the hardware you need for desktop video now.

Those were the very people who, twenty years ago, were putting in CAD systems for drafting. So that's the filtering-down process, and I don't mean filtering down passively, I mean people like Autodesk pushing that technology out into the world, and creating opportunity for these people. Because it's fundamentally an issue of productivity gain. It's productivity gain, and that's survival in the manufacturing business.

Is this one of the areas where the Cyberspace project would tie in?

It's central to why I encouraged Autodesk to start the Cyberspace project.

I recognize that all kinds of people say different things about this. To me, Cyberspace isn't William Gibson's vision, it isn't the global net. When I use the word, I'm simply talking about a 3-D user interface. That is all I'm talking about when I use the word.

One of the things I wanted us to do two years ago, and maybe when we get the product finished we'll actually be able to do, is to have the world's first Cyberspace race. Take a simple mechanical part, like a universal joint for example—two U's and a couple of pins—and set up three workstations, as they were, side by side. One has a very conventional 3-D CAD system with a tablet interface and a flat screen. The other has a nice shaded 3-D fast rendering engine on a flat screen, and a dial box and various things you use in high-end mechanical CAD. And the third has the Cyberspace station, whatever technology we're using. The guy fires the starting gun, and three people, from all the parts of this thing, assemble it in space, which is basically positioning operations. Position this so it aligns with this, put this piece in here. This is something you can do on any CAD system in the world.

If we've got Cyberspace right, the guy with the Cyberspace rig is going to be able to do it in about ten seconds. It doesn't take long to put a U-joint together—you just pick it up and *whoosh* you're done. With a great graphical user interface—click, drag, position, pull down menu, dialog box, drag, align—it's ten times longer. And if you're working on a tablet with a 2-D, you're typing in all these numbers and angles and aligning this and verifying that, and looking at it from a different angle...

That seemed to me to be the big win in Cyberspace. To me, the relationship between Cyberspace and CAD was the same as between drafting CAD and high-performance graphics. In the early days of the graphics business, back when we had Adage displays and huge Tektronix storage tubes and other things that cost large amounts of money, they were bought by the very first high-end CAD users. Because as expensive as graphics were in those days, there was a clear productivity gain in doing CAD with graphics over doing CAD without graphics.

Similarly, I think the early adopters of Cyberspace are going to be people doing 3-D modeling and 3-D positioning. And ranging all over the design spectrum, certainly not just mechanical; architectural walkthroughs are an obvious application. Really, across all of 3-D design. That's an application that can really bootstrap this hardware to the point that it becomes accessible for lots of other people.

Time has proven me wrong, by the way. That's why I thought virtual reality was going to happen in 1988, and a lot of other people were saying "No, it's entertainment that's going to push it out first." And entertainment has. There's much more VR hardware both being developed and being used in entertainment applications than in design at this point.

I guess one could also say that the VR hardware we have is so bad that a designer can't really use it now, and that's part of the problem.

It's like, you can play a game with a Nintendo, but you need better resolution than that if you're going to do serious design. And I guess we're kind of at the Nintendo level.

If you're manufacturing sensitive parts, Nintendo is not what you need.

Right. And it's also a question of how complicated things can be. A 12, 15, 35MB CAD database is large, but not huge. Designs are very, very complicated things. The CAD user always wants to have more and more speed and complexity, simply because they don't want to have fifty separate models that are subassemblies, they'd like to have it all in one faithful model.

So the CAD user is always trying to get more CPU power, more graphics resolution, more speed, simply because of the productivity win of being able to get larger models in there. When you start talking about VR hardware that can't track in real time when you have two thousand polygons—two thousand polygons is *nothing* in the CAD business. We're talking millions. Tens of millions.

Where does multimedia segue into all this? Where do sound and motion become important?

Well, I never thought of sound and motion as media. I don't use the M-word. I prefer to describe what we do in our division that bears the M-word as desktop video.

I think desktop video is a huge business—again, one of those businesses that nobody is going to take seriously until the hardware appears that really does the job. And when the hardware appears, it is going to be *so obvious* that it's going to change the world. Vast amounts of money are going to be made, people are going to do things in different ways, people are going to learn new skills.

Today we're really at the Altair level of desktop video, just about. The hardware is something that an enthusiast can get very excited about, and with a vast amount of suffering can do amazingly impressive things—if you're another enthusiast.

We all remember back in 1976—"Wow! Look! It plays Tic-Tac-Toe!" "Wow! It computes the first eight digits of pi in six hours! That's really cool, isn't it?" "Yeah, yeah, that's cool!" [*laughs*] It took a while, and everybody who "got it," to use Ted Nelson's phrase, understood that in five years these things were going to completely change the world. It would change the way everything was written. They understood that someday, modems would connect all these things together, and there would be a global community.

But that [*laughs*] took a lot of imagination. You had to be plugged in to what had been done on the high end, to see the potential, and you had to believe in something that I think for a lot of people is very difficult to believe in.

There aren't many times in human history that you can draw a straight line on semi-log paper over forty years, and have that trend continue. If you talk to people in a normal business and say, "Well, okay, yeah, a car today goes 55 miles an hour, but in ten years it's going to go half the speed of light," they kind of say, "What are you *talking* about?" But here we say, "Well, yeah, sure, we design something assuming everybody's going to have 32MB in their PC in three years." I have 32MB in my PC *today*, and it cost me less than my Altair.

It's really mind boggling. And if you really accept that, you can buy into technologies that today don't look terribly promising at first glance.

How big is the market for desktop video? Well, how many

The CAD user always wants to have more and more speed and complexity, simply because they don't want to have fifty separate models that are subassemblies, they'd like to have it all in one faithful model. So the CAD user is always trying to get more CPU power, more graphics resolution, more speed, simply because of the productivity win.

camcorders are there out there? You own a camcorder for what, an hour, before you realize, "Gee, it'd be really nice to be able to edit this stuff." "How do I do that?" "Well, you can't." "What do you mean I can't?" "Well, you can buy all this special hardware and it still doesn't work." "Why can't I just do that on my PC?"

Well, why can't you, after all? You can go to Ted's houseboat and use his Avid system. Clearly everybody's going to be able to do that on their PC. The Avid's a Macintosh, after all, with some special hardware in it. That technology is going to be everywhere.

It's a new art medium. You don't just make a new art medium available to a lot of people and suddenly expect a million people to run out and start using it. I'm sure it took things like frescoes a while to catch on also—the technology has to get diffused...

When you make a technology like that available, you can't expect suddenly to have everybody start using it. You sell the technology, and every trained animator in the world buys it. Okay, well that's a hundred and fifty. What about the next million? Well, you've got to get it into the schools, you've got to get books written about it, you've got to show people what they can do with it. You've got to give them something to start with so they aren't faced with a blank sheet of paper. After all, you tend to start with a coloring book rather than a notepad, and that's a lot of what we have to do to get it primed.

But in the long term, how can it *not* be something huge?

But I don't think there's going to be a multimedia market any more than there's going to be a graphics market. In the '60s and early '70s, there was the computer graphics industry. Analysts would tell you how much market share each of the players had in the computer graphics industry—Adage and Sanders and all these people were out there, Tektronix owned a huge piece, CalComp owned a huge piece with their plotters.

There isn't any computer graphics industry any more. It's gone. It's in the box. Plug in the PC, and there's graphics. If it doesn't have graphics, it will in a year. So there's no graphics industry. Those people that sold that stuff in the graphics industry, for the most part, are still around, selling what's now the high-end stuff. But that's not the graphics industry. Graphics is part of the PC.

How many years is it going to be? Every PC is going be able to read and write sound and read and write video. It's not going to be as useful if it doesn't have that capability. And I think we're really there. Every Macintosh has had sound since Day One, and I think really every Windows machine is going to have sound very soon, except in large corporate applications or something like that. It's just a matter of time before the chip's on the motherboard.

We spent the first three years around here trying to convince people in this grand and glorious world that you needed a floating point coprocessor. We used to have a version of AutoCAD that ran without the floating point coprocessor, for longer than I either remember or would like to tell you. You plug in the coprocessor, and the product runs five times faster. Not until the 486 was floating point a standard part of the microprocessor—and what's the first thing they did? Take it out! Make a 486SX that doesn't have floating point, and then sell you this floating point that's the whole chip! It's crazy!

We saw that with floating point. We've seen it with graphics being in the box. From the very early days, we sold very well on machines that came with graphics. For the first year of Autodesk, Victor 9000 outsold IBM, because the Victor 9000 came with 800 x 400 graphics right out of the box.

Once something is in the box, the software will appear. People will start to use it. And I think we're really getting to that point on the hardware you need for desktop video now.

We're going to get sound hardware on the motherboard, I expect, within the next generation of motherboards. We're what, maybe two or three years from having the JPEG chip as a standard component. All these little pieces have to come together. But they clearly will.

One of the things we actually did market research on was what percentage of people who own a camcorder own a PC. And it's a huge percentage. If you told people that you could do useful editing, useful production titling, with your PC, a large number of people would, and that's a number in the tens of millions.

There's this feeling that all the money in multimedia is going to be made in titles, in CD-ROMs. I'm not sure that's true. I think we may be trying to apply the TV model of the passive receiver of information, to something that's a creative medium. I'm sure it'll exist, but I'm a lot more interested in getting the creative tools out into as many hands as possible, because I think that's going to cause this upwelling of software.

We've seen it before. How can you talk seriously about selling tens of millions of Pascal compilers and C compilers? Nobody wants to be a programmer! And yet people have bought tens of millions of Pascal and C compilers, and it's changed the world. Because anybody can program now. You don't have to work for a big company and do what they say. And look at all the software that's been created by these people.

That's what we need to do with these video communication tools. And we're just at the beginning of a terribly long cycle here.

Do you see that dovetailing with CAD at any point?

Again, I think the CAD user will be the early adopter of many of these technologies. We're seeing it already. Clearly, architectural walkthroughs are a major application of 3D Studio. Product illustrations, product concepts, are places that CAD and multimedia/desktop video fit together very well.

A substantial number of our installed base are people who either already have AutoCAD or use AutoCAD within an organization, and I think that's a toehold that can make us successful in this market. I think the parallel with Cyberspace is very similar here.

To get very far with this stuff, you've got to understand 3-D modeling. And there aren't a lot of people in the world who understand 3-D modeling, except CAD users. You don't have to bootstrap them up through the whole concept of building models, thinking in 3-D, working in 3-D, handling lights, handling rendering. They already know that. They're doing it. So to a CAD user, you're simply saying, "All you're really doing is adding motion and dynamics" to something they already understand.

If you're talking to somebody who watches MTV and would like to do stuff like that at home, you have a much longer learning curve.

Clearly the people that first bought PCs were people that already used computers at work. It took a while to broaden out. But it's inevitable that it will.

You've said something I thought was intriguing—that there's

Continued on page 88

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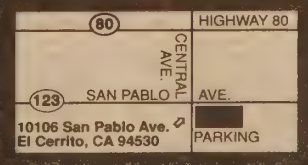

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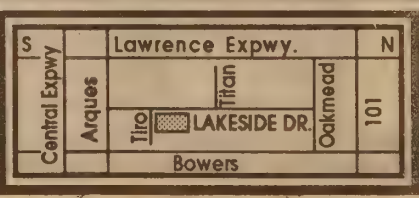

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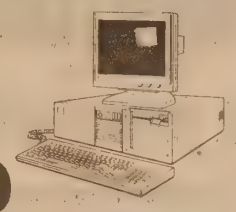

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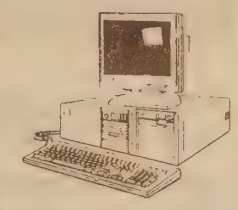

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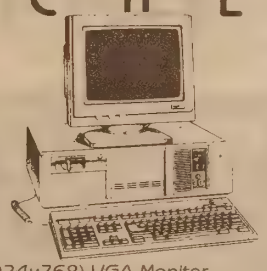

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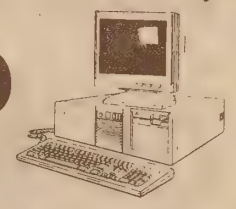

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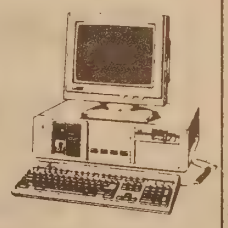

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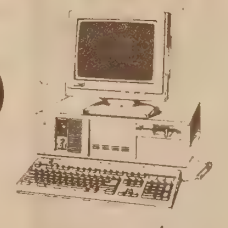

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1024x768 Fastest VGA Card

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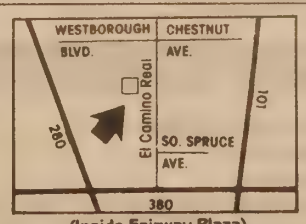

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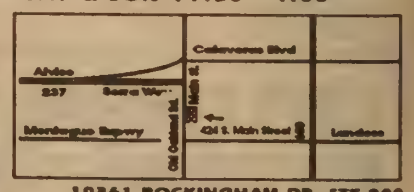

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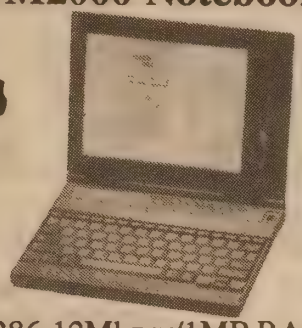

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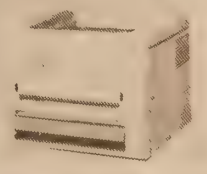

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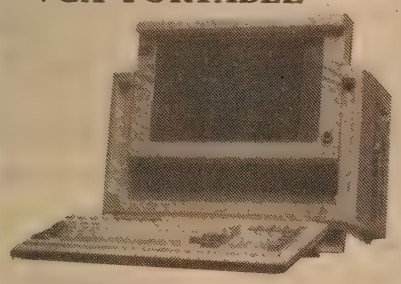

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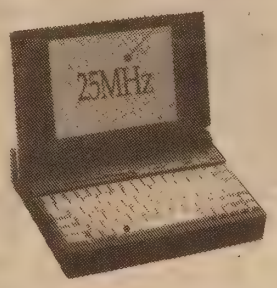

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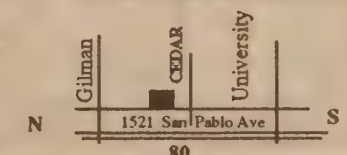

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- DOS 5.0
- Microsoft Comp. Mouse

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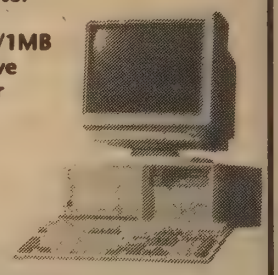
- Clock/Calendar
- 101 Enhanced Keyboard
- Desktop Case
- Windows 3.1
- DOS 5.0
- Microsoft Comp. Mouse



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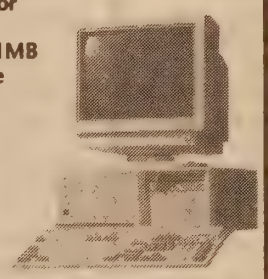

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80 MB Hard Drive

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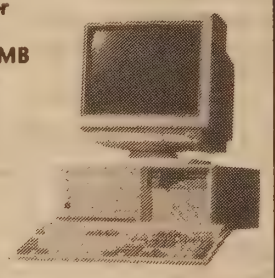
- 80 MB Conner Hard Drive
- 14" Mitac Super VGA Monitor (1024x768) .28dp
- Trident Super VGA Card w/1MB
- Teac 3.5 & 5.25 Floppy Drive
- IDE Hard/Floppy Controller
- 1P/2S/1G Ports
- Clock/Calendar
- 101 Enhanced Keyboard
- Desktop Case
- Windows 3.1
- DOS 5.0
- Microsoft Comp. Mouse



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386SX-25
Super VGA Monitor
80 MB Hard Drive

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- 2MB exp. to 8MB
- 80 MB Conner Hard Drive
- 14" Mitac Super VGA Monitor (1024x768) .28dp
- Trident Super VGA Card w/1MB
- Teac 3.5 & 5.25 Floppy Drive
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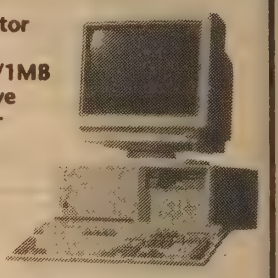
- 1P/2S/1G Ports
- Clock/Calendar
- 101 Enhanced Keyboard
- Desktop Case
- Windows 3.1
- DOS 5.0
- Microsoft Comp. Mouse



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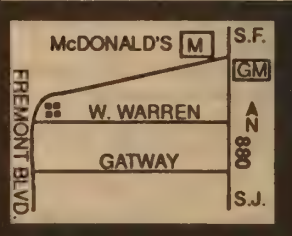

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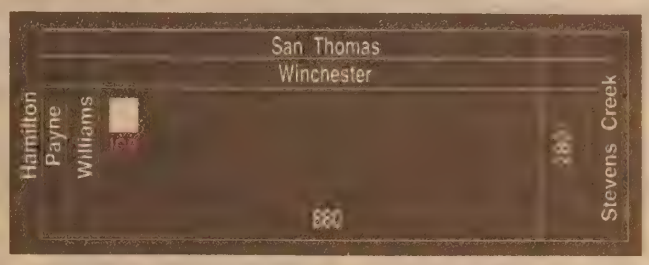

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486/33 2Yr Parts & Labor	Nice USA	256	1.2/1.44	130Mb 15ms	512K 16 bit	1024x768 .28 dp	4Mb	2S/1P/1G	IDE 2F/2D	Mini or Flat	101	Yes	Yes	$1699
486/33 1Yr Parts & Labor	Zetex USA	64	1.2/1.44	105Mb	512K 16 bit	1024x768 .28 dp	4Mb	2S/1P/1G	IDE 2F/2D	Mini or Flat	101	Yes	Yes	$1459
386/33 1Yr Parts & Labor	ICS	64	1.2/1.44	105Mb	512K 16 bit	1024x768 .28 dp	4Mb	2S/1P/1G	IDE 2F/2D	Mini or Flat	101	Yes	Yes	$1159
386/25 1Yr Parts & Labor	ICS		1.2	80Mb	512K 16 bit	1024x768 .39 dp	1Mb	2S/1P/1G	IDE 2F/2D	Mini or Flat	101	Yes	Yes	$995
386SX/25 1Yr Parts & Labor	ICS		1.2	80Mb	16 bit	1024x768 .39 dp	1Mb	2S/1P/1G	IDE 2F/2D	Mini or Flat	101	Yes	Yes	$935
286/16 1Yr Parts & Labor	ICS		1.2	40Mb	16 bit	1024x768 .39 dp	1Mb	2S/1P/1G	IDE 2F/2D	Mini or Flat	101	Yes	Yes	$749

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d. Addonics 1024x768 .28 dp 70Hz $375
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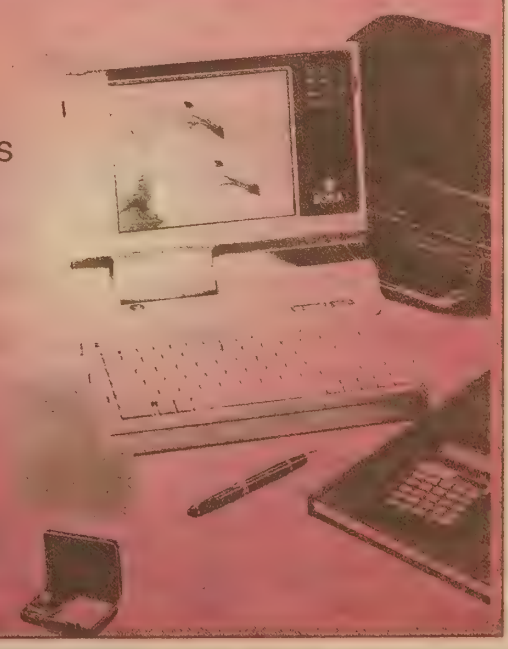

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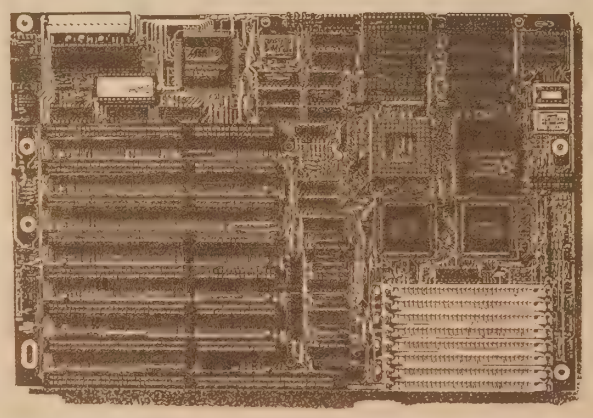
- XENIX,
- NOVELL,
- CAD/CAM,
- DTP



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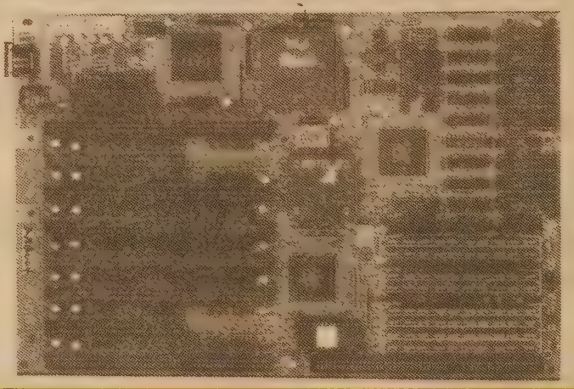

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486-33 WITH 64K CACHE	559
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256x9-70	12
256x9-10	10
256x9-80	11
256x9-60	12

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80386SX-16	45
80386SX-25 AMD	63
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80486DX-33	399
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V-20-10	10
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80287-10 10 MHz	89
80C287-12 12 MHz	109
80387SX-16	129
80387SX-20	135
80387DX-20	140
80387DX-25	185
80387DX-33	195

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3167-25 25 MHz	350
3167-33 33 MHz	475
4167-25 MHz	550
4167-33 MHz	700

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83087-25 25 MHz	155
83087-33 33 MHz	185
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8C387-20	155
8C387-20SX	155
8C387-33	135

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4 MB Board	260

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6450603 1 MB Module	79
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6450604 2 MB Module	129
Mdls 70-A21; -A61; -B21; -B61	
6450608 2 MB Module	129
Mdls 55SX; 65SX; 55LS; 65LS	
34F2933 4 MB Module	210
Mdl 80-041	
6450375 1 MB Card	125
Mdls 80-111; -121; -311; -321	
6450379 2 MB Card	150
Mdls 80-A21; -A31	
6451060 4 MB Card	285
Mdls 90; -95	
6450902 2 MB Module	175
6450128 4 MB Module	275
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6450609 2-14 MB Exp Brd	325
Mdls 70 & 80	
6450605 2-8 MB Exp Brd	375
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4 MB Module	439
6 MB Module	565

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X116H 16 MB Kit	850
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Mdl SPARC SLC	
X105Z 4 MB Module	250
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500718-002 1 MB Module	75
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500718-001 1 MB Module	75
Premium 386C; 386/16; Advance FASTRAM; FASTboard 386	
500510-007 1 MB Kit	95
500510-008 4 MB Kit	225
Premium 386	
500510-003 1 MB Kit (static)	115
500510-004 4 MB Kit (static)	250
Cupid Exp Brd for Premium 386/25; 386/33; 486's	
500722-004 1-16 MB Exp Brd	425
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1 MB Module	99
4 MB Module	210

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Z-605-1 2 MB Kit	$155
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ZA-180-86 2 MB Card (ALPHA)	199
ZA-180-87 2 MB Card (BETA)	199
SuperSport 286; 286E	
ZA-180-66 1 MB Card	185
SuperSport 286E	
ZA-180-64 2 MB Card	199
Turbosport 386E	
ZA-3034-ME 1 MB Card	199
4 MB Memory Card	495

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68020	16 MHz	$129
	20 MHz	169
	25 MHz	179
	33 MHz	199
68030	16 MHz	129
	25 MHz	199
68010	16 MHz	60

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QS 410	
1 MB	$210
2 MB	150
3 MB	199
4 MB	220

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DeskPro 386/20e; 25e	
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112534-001 4MB Module	220
113633-001 1-9MB Exp Brd	175
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108069-002 2MB Exp Brd	325
108070-001 4MB Exp Brd	490
108070-002 8MB Exp Brd	750
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107651-001 1MB Kit	199
107653-001 4MB Exp Brd	325
107654-001 4MB Exp Brd	325
Portable LTE/286	
117081-001 1MB Module	99
117081-002 2MB Module	150
117081-003 4MB Module	450
Portable SLT/286	
110235-001 1MB Module	175
110237-001 4MB Module	375
Portable SLT/386	
118303-001 1MB Module	125
118304-001 2MB Module	199
118305-001 4MB Module	325
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T3100e 2 MB CARD	125
T3200SX 2 MB CARD	125
4 MB CARD	210
T3200 3 MB CARD	199
T1000SE; XE 1 MB CARD	125
2 MB CARD	175
T5100 2 MB CARD	125
T5200; T8500 2 MB CARD	125

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VECTRA 486 PC (must install in pairs)	
D2150A 1 MB Module	$99
D2152A 8 MB Module	475
VECTRA 386/25 PC	
D2381A 2 MB Module	150
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D1640A 1 MB Kit	135
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Apollo DN3010A; 3500; 3550; 4000; 4500	
2-8 MB Exp Brd	609

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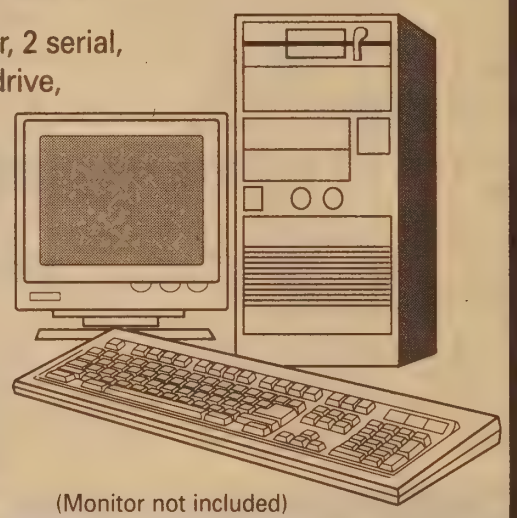

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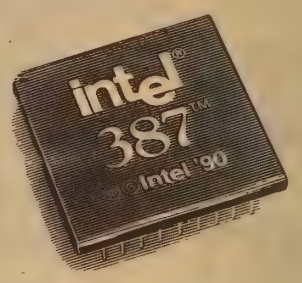

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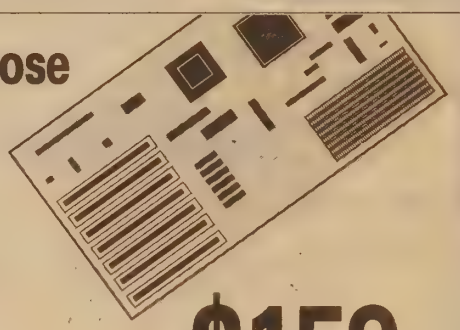

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386DX-25MHz 64K caches	$565
386DX-33MHz 64K caches	$620
386DX-40MHz 64K caches	$630
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486SX-25MHz	$760
486DX-33MHz	Call
486DX-33MHz 128K caches	Call

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486-33MHz motherboard 128K	Call
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Mouse(microsoft-compa.)

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		OP. B	$ 1262	$ 1321	$ 1519
		OP. C	$ 1310	$ 1369	$ 1567
		OP. D	$ 1533	$ 1592	$ 1790
386 -40 64 Cache exp. 32 Meg on board	$ 413	no. OP.	$ 700	$ 759	$ 957
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		OP. B	$ 1275	$ 1334	$ 1531
		OP. C	$ 1322	$ 1381	$ 1579
		OP. D	$ 1546	$ 1605	$ 1805
486 -33/64 Cache exp. 32 Megon board	$ 698	no. OP.	$ 944	$ 1003	$ 1201
		OP. A	$ 1436	$ 1495	$ 1693
		OP. B	$ 1520	$ 1578	$ 1776
		OP. C	$ 1566	$ 1625	$ 1823
		OP. D	$ 1791	$ 1866	$ 2046
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Adapted SCSI 1542KB w/Kit (ISA)	274
Ultrastor SCSI 24F / 24C (EISA)	498 / 698
Ultrastor ESDI 22F / 22C (EISA)	498 / 698

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Panasonic KX-P1180	154
Panasonic KX-P1123	198
Panasonic KX-P112i	284
Panasonic KX-P1624	358
Cable for Printer	5

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Fax Modem (9600 Fax,2400 Modem)	73
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Logitech Mouseman Serial (400 dpi)	63
Logitech Mouseman Bus (400dpi)	66
Colorado Tape Backup DJ-10/20	193 / 263
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Medium Tower Case w/200W PS	99
Full Tower Case w/230W PS	139

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Oak VGA-512K (1024•768, 16-Bit)	48
Trident 1MB (1024•768•256)	78
Ahead VGA Wizard Deluxe w/1MB (70Hz)	138
Video 7102i w/512KB	166
Video 7VRAM II w/1MB	338
Diamond Steelth	247
Diamond Speed Star w/Hi-Color	147
Orchid IIs/Fahrenheit 1280 w/1MB	227
Orchid Prodesigner IIs w/Hi-Color	150
Orchid IIs w/1MB with Sony 1034HG	708
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Nanao 9080i (16", 1280•1024, 0.28)	1,028
NEC 3FGX (15", 1024•768, 0.28)	647
NEC 4FG (15", 1024•768, 0.28)	798
NED 4DS (16", 1024•768, 0.28)	978
NEC 5FG (20", 1280•1024, 0.31)	1,340
Sony CPD 1304(14", 1024•768, 0.25)	548
Sony CPD 1604 (17", 1024•768, 0.25)	975
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Super VGA (1024•768, 0.28) Non-int	333
14"SVGA (1024•768, 0.39) Monitor with 16-Bit SVGA 512K Card	278
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12" Mono Monitor w/MGP Card	88
14" Mono Monitor w/MGP Card	108

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120mb/16ms (IDE) Connor	323
130mb/15ms (IDE) Maxtor	333
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200mb/16ms (SCSI)	537
240mb/15ms (IDE) Quantum	587
340mb/15ms (SCSI or IDE) Maxtor	863
676mb/16ms (SCSI or IDE)	1253

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4 MB - 70 Simm	145
4 MB - 80 Simm	135
1 MB - 60	40
1MB - 70	36
1 MB - 80	33
256K 80 Simm	10
387SX-20	120
387DX-33/25/20/16	145

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Maxiswitch	34
Keytronics	39
Focus 2001 / 3001 / 5001	44 / 64 / 74
Omnikey 102 / Ultra	84 / 114

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MICRO MARKETPLACE

MicroMarketplace

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286-12.....$278
286-20.....$292
386SX16/25.....$329/349
386DX25.....$403
386DX33C64.....$455
386DX40C64.....$473
486SX20.....$525
486DX33C64.....$785
486DX33C256.....$830
486DX50C256.....$1045
Including: Case, 1MB, IDE, I/O, 1.2 or 1.44 Teac FDD, 101K KB

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Mono Display.....$85
VGA .39 Std.....$249
SVGA .28.....$312

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SX16, 1MB, 40MB Laptop.....$1130
SX16, 2MB, 60MB Laptop.....$1355
SX25, 2MB, 60MB NBook.....$1845
Top Link (Taiwan)
SX20, 2MB, 60MB NBook.....$1585
Clover 386-33,4M,80M NB....$2985

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PC based Terminals --
Network ready, Remote Boot, 1MB, diskless, 12" Mono, KB.
286-12 PC.....$410
386SX25 PC.....$479
386DX25 PC.....$560

WYSE Terminals --
WYSE 30+ w/Keyboard.....$305
WYSE 50 w/Keyboard.....$409
WYSE 60 w/o Keyboard.....$315
Call for other WYSE products.

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486-33 Cache Comp ISA, 8MB, 213 MB SCSI w/ Adaptec 1542....$2195

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286-12/20.....$62/76
386SX-16 VLSI.....$114
386SX-25 VLSI.....$134

386DX-25.....$191
386DX-33 w/64K Cache.....$239
386DX-40 w/64K Cache.....$257

486SX-20 Ugrdble to DX.....$309
486DX-33 w/64K Cache.....$569
486DX-33 w/256K Cache.....$614
486DX-50 w/256K Cache.....$829
486DX-33 EISA 64K.....$1125
Surface Mount Boards
386DX-33 w/64K Cache.....$264
386DX-40 w/64K Cache.....$284
486DX-33/50 w/64K C.....$599/849

US Made --
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386SX-16 w/ I/O.....$179
386DX-33 w/ I/O, IDE 64K.....$508
486DX-33 w/ IDE, I/O 128K.....$885
486DX-33 EISA 128K.....$1450

Cache Computers (2 yrs)
486DX-33 ISA IDE, IO, 128K.....$756
386DX-33 w/64K (upto 8 MB).....$275

TYAN 486-50 EISA w/256K $1469
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Genoa 386-40 w/64K $315

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Full Tower Std/Del w/PS.....$109/139

Rack Mount.....$259
File Server w/ 400W PS,3 Fans...
12 F/HDD, black/beige.....$549
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Baby Desk/Tower w/PS.....$91
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Full Tower w /PS.....$152

See elsewhere for Black matching Keyboard, Mouse, SVGA Monitor

External HDD Cases
1FH/2HH...65W.....$79
2FH/4HH...65W.....$139
Power Supplies
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PC Power XT Turbo Cool 230.....$85
220 AT.....$48
PS2 200W.....$42
PS2 300 W.....$99
Full Tower 230W.....$61
Full Tower 300/400.....$80/154

UPS's see in Networking Products

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IDE 2FD/2HD.....$15
IDE 4FD/2HD.....$33
IDE w/ 2SPG.....$24
IDE Caching UltraStor.....$235
MFM ST21M.....$39
MFM DTC.....$59
RLL 4FD/2HD.....$69
SCSI
DTC.....$109
Future Domain Comp.....$54
ADAP 1522B/Kit.....$129/157
ADAP 1542B/Kit.....$239/269
ADAP 1740 EISA.....$469
DTC EISA Caching.....$485
MYLEX EISA Caching.....$584
DPT Smart Cache+ ISA....$460
DPT Smart Cache+EISA...$540
DPT +Caching Module.....$385
DPT 4MB Mem Module....$454
ESDI
DTC.....$119
Maple 64K.....$107
Ultra 12F 32K.....$164
Ultra 22F Caching EISA.....$449

XT FDC360/1.2.....$13/24
XT HDC.....$45

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MGP.....$12
Color Card.....$23
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VGA 256k/512k.....$33/46
Trident 1MB.....$72
Tseng 1MB.....$99
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Orchid IIs w/ 32K Color.....$172
Orchid Fahrenheit.....$254
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CON/Q/WD 80.....$277
ST/CON/Q/105.....$299
CON/MXT/ST 120/130.....$349
Quan 170.....$429
CON 170.....$399
CON/MXT 200.....$575
Quan 240.....$629
MXT 340.....$875
Fuj/CON 425MB/540MB....$1120/1220
MFM/RLL
ST40.....$217
ST80.....full h.....$269
ST66 RLL.....$267
ESDI
ST 172/338.....$737/1167
MXT203.....$757
MXT338/670.....$1067/1299
SCSI
CON 40.....$209
CON/MXT 105/120.....$320/345
CON/MXT 204.....$579
CON 540.....$1245
ST 89 5.25".....$287
ST 172/338 5.25".....$607/1057
ST 4766N 680.....$1299
ST 1.2GB.....$1795
MXT 81/157....5.25".....$297/827
MXT 213/340.....$587/925
MXT 670.....$1322
MXT 1G.....$1795
FUJ340/425/540.....$1063/1158/1220
FUJ 680.....$1245
FUJ 1G.....5 yr.....$1795
ST/MXT 1.7GB.....$2195

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Syquest 44MB Dr.....$318
Syquest 88MB Dr.....$445
Bernoulli 44 Insider.....$820
Bernoulli 90 Insider.....$840
Cartridges see storage media
IDE: Upto 1GB removable kits.....$39

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Colorado 250MB.....$255
Colorado 700MB.....$750
Archive 525S.....$795
Alliance [built in parallel interface] 250 ..MB, 5.25", DC 6250 full kit.....$1195

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80MB 2.5" IDE.....$

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Mono 12".....$73
Mono 14".....$93
Mono 9" VGA.....$120
Mono 14" VGA.....$109

Black SVGA 1024,.28.....$309
SVGA PBell Made in Japan.....$327
VGA 640,.39.....$221
VGA 640,.28.....$269
SVGA 1024,.28..Hyundai.....$279
SVGA CTX Autoswitch.....$299
SVGA PB Made in Japan.....$325
M/Syn V3.....$447
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SVGA NI CTX.....$339
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Samsung 17".....$769
Magnavox 20" 1280 NI.....$1545

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Floppy 1.2 Bulk.....$.49
Tape DC2000XL.....$18
Tape DC2120 250MB.....$19
DAT 4mm 60/90 mtr.....$19/29
DAT 8mm 54/112 mtr.....$18/24
Syquest 44MB Cart.....$73
Syquest 88MB Cart.....$119
Bernoulli 44MB 3Pk.....$315
Bernoulli 90MN 3Pk.....$442

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any generic PC.

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SCO UNIX m user 3.2.2.....$680
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DOS 6..DR.....$69
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US Made 486-33,
1MB RAM, 1 Teac Floppy Drive
130MB SGT3144 HDD
101 Keyboard
Color 14" SVGA .26
Baby Case

"FCC B"
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Mini Tower, 1 Teac Drive
80 MB IDE, Cont.
101 Keyboard
Mono 14" VGA

"FCC B"
.....**$999**

386SX25, 1MB
Mini Tower, 1 Teac Drive
40 MB IDE, Cont.
101 Keyboard
12" Mono Display

"FCC B".....**$699**

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15MVX 15" FST .28, LMF,70Hz...$599
CM2085 20" 1280 Anti Glare.....$1625
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CM2187 21" FST 1600 Micro.....$2415
Toshiba
P17CU01 17",FST,1024,70Hz.....$975
P17CS01 17",FST,1280,.26.....$1310
P21CM00 21",FST,1280.....$2129
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CPD1304S 14",*MPRII*,70Hz.....$559
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MV550 15",FST,.28,70Hz.....$599
MV850 17",FST,70Hz.....$929
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Magnavox
20CM64 20",1280NI,.31.....$1545
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3FGX 15",.25.....$639
4FG 15",.25,Microp.....$769
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6FG 21",.26,Microp.....$2859

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L22 Win,T34020,1280,72Hz,16C..$944
L23 ACAD,T34020,1280,16C.....$1228
L24 Win,T34020,1280,256C.....$1304
L25 ACAD,T34020,1280,256C...$1446
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GOLD 16+2, Ti34010.....$509
GOLD 24, Ti34010, 24 Bit.....$456
GOLD 24+2, Ti34010, 24 Bit.....$575
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Design Master, 32k Color.....$315
MYLEX
GXE020B Ti34020.....$1045
DIAMOND COMPUTERS
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Speedstar Hi-Color.....$160
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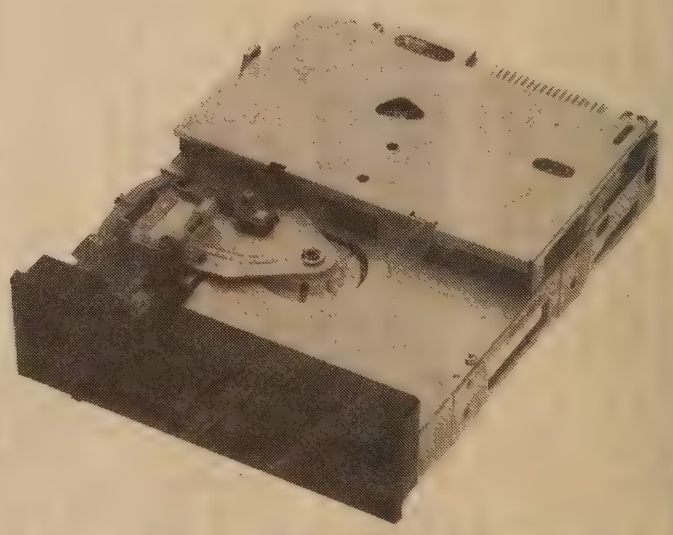

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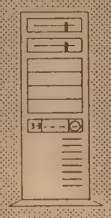

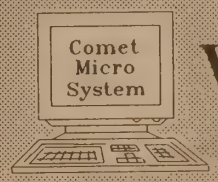

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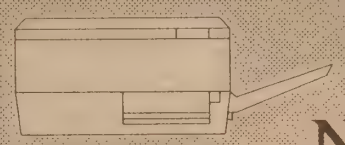

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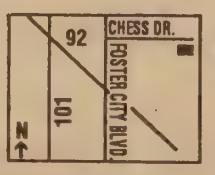

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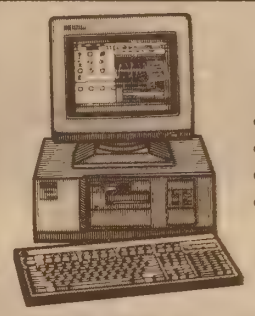

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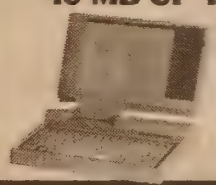

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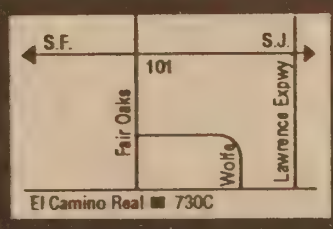

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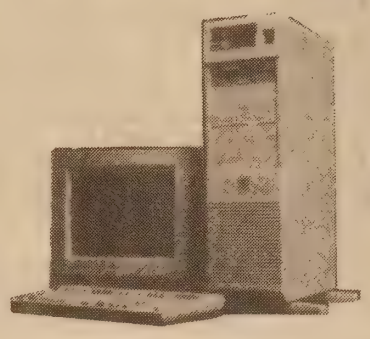

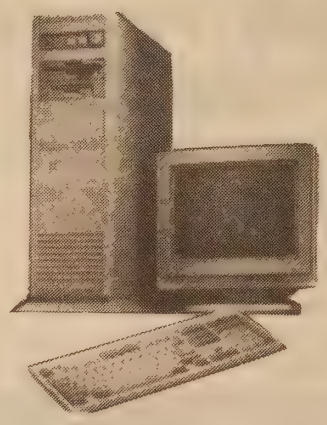

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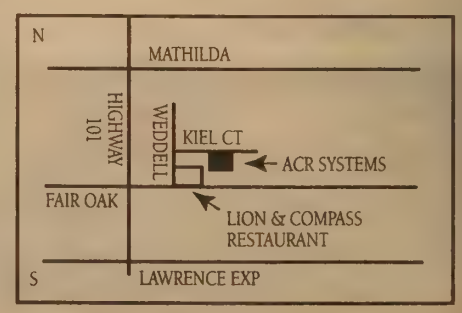

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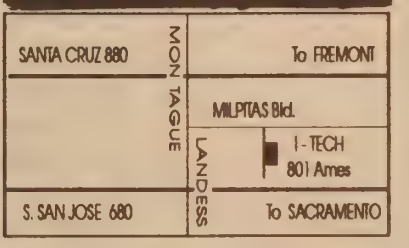

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If a company focuses too much on the short term, on the margins this quarter, the margins over the next year, and sacrifices market share, that's a bad business decision. That is squandering an asset of the company for a near-term benefit.

Continued from page 68

a perception that CAD is a vertical nichey market, but that after all, there was a time ten years ago when spreadsheets were considered a vertical nichey market. How do you see the analogous transformation taking place?

Well, CAD is about building models of real-world objects inside the computer. That is what CAD is. I believe that in the fullness of time, every object in the world, manufactured or not, will be modeled inside a computer.

That is a very, very big market. This is *everything.*

Look at the huge successes in digital technology. It's basically been making things that used to be analog digital, right? In some finite number of generations we won't have to suffer through this [photo shoot] because there will be digital cameras that are good enough to do that. Sound went digital in the 1980s; it was one of the huge consumer electronics successes. Musical instruments went digital, with MIDI. I think we see on the horizon that television is going digital, with whatever technology they adopt for HDTV.

And every time you go digital, whatever the original motivation may be, you end up with a tremendous number of ancillary benefits. The fact that the data are in a form that one can process them fundamentally changes things.

What CAD is about is that artifacts are going digital. In Arthur C. Clarke's book *Profiles of the Future,* in, I think, 1963, he had this timetable of the future for the next seventy-five years. One of the things he talked about was encoding of artifacts. In other words, storing artifacts in digital form, and potentially replicatable form.

That's what CAD is about. Today we're in very, very narrow areas of the whole field of being able to design and manufacture anything using your computer.

It all happened before. We had a word processing business before we had personal word processing, and it was in a very vertical market. All the analysts analyzed all the pie charts of market sector, and they missed the fact that there was a market for about another half billion word processors that weren't in the word processing market.

That's what's beginning to happen with CAD. We've seen it over the last ten years, but we haven't really seen anything like the takeoff yet. If you have lots of money and are very patient, you can get a stereo lithography system, set it up on your desk, build a 3-D model of something, push a button, and after an embarrassingly long time, get a piece of plastic that is a 3-D, faithful-within-the-resolution-constraints-of-this-device model. That's desktop manufacturing, and again, that's worse than the Altair level right now in terms of cost and time and plastic that you use and so forth.

But I expect in the ultimate destiny of this that there's going to be an appliance that sits on your desktop that can make anything. I don't expect that to happen within the lifetime of AutoCAD Release 13 or 14. But that's where it's all going.

This week we're shipping HyperChem, which lets you design objects at the molecular level. The technology is going to go on scaling down until we have the same level of fine-grained control over the structure of matter that biology has been using for the last billion years or so. And at that point, we're going to be able to make *anything* from a digital model.

That's going to change the world, beyond comprehension, I think.

And central to all of that happening is computer-aided design. You can't do anything without building a model of it. If you're building a workbench, even if you're doing it in your head, you have a model of it in your head. Something tells you how long to saw off the plank, something tells you how many supports you need. You have a model of it.

Doing models in a computer is going to make the whole process much simpler, eventually. When we figure out how to communicate these things, when we have the right user interface technology, when we have enough compute power to throw at these problems.

As the microcomputer has evolved, we've been picking off the easy things. Word processing, the personal database, the spreadsheet. I think the thing that kind of holds what Autodesk does together is we're doing stuff that's going to use up all those compute cycles over the next twenty or thirty years.

If you go on drawing that line on semi-log paper, and you assume that in 1998 you have the power of a Cray 2 on your desk—what are you going to use it for? You're going to use it to do things that are fundamentally different from what you use your Macintosh for, and are the kind of things that very, very few people are doing with Cray 2s right now.

That's what we try to identify—bet on the technology going on, start to build these ambitious things that can take advantage of the computing power as it arrives. That's what we've done constantly in CAD. I think we see it in desktop video. We certainly see it in molecular modeling. Xanadu's great today, but it's about one hundred times too slow. Well, time will solve that.

Those are the kinds of technologies, to me, that are a lot more interesting than going out and competing for market share points in the spreadsheet market or the word processing market or the database market.

These are things that don't exist at all today. It's hard to keep focused sometimes, as the years pass, on getting these things finished, and to keep the belief that it's going to happen.

But we have an existence proof. AutoCAD was not viable at the time we started working on it. There simply wasn't enough compute power around to do the job. The graphics were laughable. Time solved that. And if time hadn't solved that, we wouldn't be around.

As a strategy it can't fail. The strategy can only fail if you don't believe in it or you don't execute it properly. Do we really think that this evolution of technology is going to stop in the next two or three years? That suddenly machines aren't going to get any faster or have more memory? Even just the linear progression of the stuff we've got is going to carry us into the 21st century.

To me, plotting the strategy for a software company isn't very difficult. Particularly once you have a success like AutoCAD, because you have an installed base that is beating you over the head—"We want this, we want that, we want this other thing. We want you to do this. We also want this." So you don't have to do an enormous amount of market research when you've got six hundred thousand people out there asking you for things that you don't have. It's basically a question of deciding what to do first.

When you have the financial strength that we have, if it costs you a quarter million dollars to do a product, and one in a hundred succeeds the way AutoCAD has succeeded, we can do a hundred failures for each success. The ratio of what it costs you to build and launch a product, even today, to what you make when you hit, is the thing that makes this business totally unique.

This isn't like the chip business. It isn't like the steel business. It isn't like the auto business. It's like the movie business. You make lots and lots of movies in the hope that, if it's a great year, you'll have one blockbuster, and if it's an unbelievable year you'll have two blockbusters. But you probably made eighteen movies that year. And you may go two or three years making eighteen, none of which is a blockbuster—they may be profitable.

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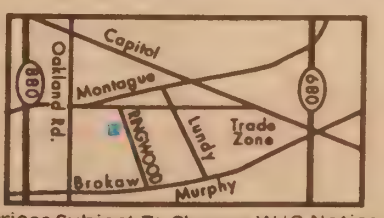

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If you don't invest in developing the people you have, in getting the right people, you're going to fail. It's just that simple. This isn't Marin County airhead mush, it's just good business. If your asset is people, and you don't invest in the asset, you're crazy. It's like you're running a railroad and you don't invest in the rails—after a while, the trains start running off. It's just stupid.

I think that's the kind of business we have here. It's a business that evolves rapidly, where preferences are difficult to predict, and yet failing to innovate is not the way you make a blockbuster. Making the nine hundredth Western doesn't give you the kind of success that making *Star Wars* did.

That's what I always look for. I think that every company that tries that—unless something exogenous happens to blow them up or they lose their vision—they all seem to succeed.

How does a company keep its edge, or its soul, or whatever you want to call it, in the face of overwhelming success?

I haven't solved that problem yet!

I know. That's why I'm asking you, because you're one of the few people I know who seem to think about it at a meaningful level.

Well, no, I think if you look at companies who are successful over a long period of time, you find that there are people there who think about those things. I'm very sure you find it at Microsoft. I'm very sure you find it at IBM.

It's a terribly difficult challenge, because when you build a company, you have to be faced with the reality that as you grow rapidly, at any point in time most of the people you have working for the company are people who arrived after the initial success that created the company.

What is really necessary is to provide the message and the history of the company, so people understand it's not like it was always there. There was a time at which it wasn't there, and there was a time in which it appeared rapidly. That's why I did *The Autodesk File*. It was not really intended to be circulated outside the company—I seem to have that problem a lot. [*laughs*] It was really just a collection of stuff that people who were interested in where the company came from could use to find out, with the goal of leveraging that experience to people that arrived too late to have lived through it.

The other part, though, is really self-fulfilling, in the sense that if you go on having successes with new products, then you have cadres of people who have seen it happen. And so it is essential that you do what is necessary to make successes of your new products. That's what I'm trying to do right now—guarantee that every product we invest in will turn into a success, if it has the fundamentals to be a success. Again, I'm willing to fail. I'm *not* willing to invest in a product and then never give it a chance—pushing it off the loading dock, as I refer to it. All of the products that we're rolling out this year will be rolled out in a manner distinctly different than the Autodesk tradition, and I believe that more than one of them will be a success.

That changes the mindset of people. You get into this depressed "everything's going to fail" mode. Everything doesn't fail. Companies have lots of successes. But you have to believe in it, and you have to make it happen.

It's not like the product comes out on the end of a conveyor belt and God looks at it and if a lightning bolt comes down you get all this money. [*laughs*] You take it off the end of the conveyor belt, you go out in the world, you start jumping up and down and waving it in front of people, and finally convince them that it's worth giving you their money to make you go away. [*laughs*] And then they take it home, and "Gee, that's really cool!"

But you have to keep pushing. If you look at the companies that advertise and promote most heavily, they're the people that make this [can of Diet Coke]. They're Kellogg's. In the case of Coke Classic, the product has not changed in over a hundred years, and the one time they changed it they regretted it. Kellogg's Corn Flakes—how often do they reengineer that product? Release 3.7? No, no, no, sorry, it's Kellogg's Corn Flakes. And yet they spend billions of dollars promoting those products, because they believe that in the year 2700, if there are still human beings, they will still be eating corn flakes, and they will still be drinking Coke. And they want to own that market, or as large a part as they can.

It's not a self-feeding process. You have to explain the benefits of your product to people. And you have to do it on an ongoing basis as you improve the product.

A lot of it seems to be mutually exclusive loops—you've got the people developing the product, you've got the people marketing the product who are completely clueless about the people who are developing the product, and so it goes all down the line.

I never used to understand, back when I was a big-computers kind of guy, the concept of the salesman who didn't understand the product. The salesman who couldn't demo the product. The programmer who didn't know the names of the competitors of the company, who wasn't familiar with the competitor's product.

To build a company that's a competitor, you have to have everybody be a little microcosm of the company. You've got to have the programmers be intimately aware of what causes the purchaser to choose their product or a competitor's product.

Now that may be marketing, or that may be sales, but if you're a developer and you don't know that, how do you know what to develop? How do you know what your target is, what your priorities are? It's not looking at the competition to be your guide, it's knowing what's in the customer's head. Knowing who the customer is. Knowing how the customer obtains the product.

Similarly, if you're out selling the product, the people you're talking to who are buying the product know about your product, they know about the competitor's product, they know about where the market's going, and if they ask you questions about things like that, and all you know is how to fill out the sales form, how are you going to sell?

So I think that you really need to imbue in the whole organization an in-depth knowledge of what this company does. I think it's got to be across the board. That is part of the reason that Information Letter #14 was so long, and that I wanted so many people to read it. It was because everybody who works here, here in Sausalito and around the world, needs to understand this business we're in, the industry we're in, and what's happening to it over the next ten years.

There weren't any secrets in it. It was really just a view of what the company had to do, that I think you cannot communicate to five people and change the outlook. You have to communicate it to everybody who works in the company, or else you have no chance.

But I certainly learned a lot about publishing. I mean, I sweated blood over this thing [*The Autodesk File*] to get this book put together. Hey, I just leave something on somebody's chair, and before you

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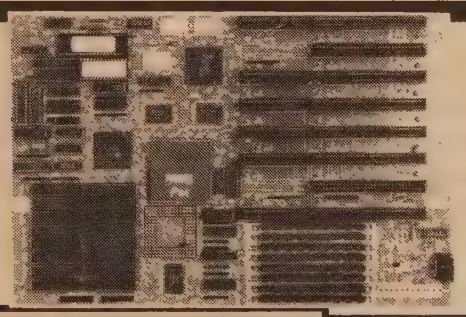

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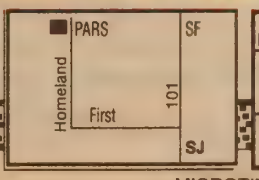

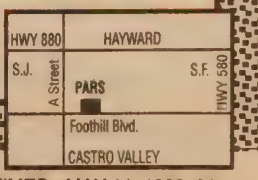

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know it it's all over the world! I guess I'll do that with my next book.

Where does AMIX fit in?

AMIX is, again, I believe, one of these little hard-to-define, hard-to-explain things that, once people experience it, is going to be so obvious that it is going to grow very, very rapidly. I really believe AMIX has as much potential to change the world as anything we've done. And even having watched it be built, heard the rationales, watched it be put together and grow—experiencing it is fundamentally different than what you expected. It's like you can imagine what it's like to be on The WELL, but it's very different to *be* on The WELL.

I've sold stuff on AMIX—actually I have a net profit in my account now—and it's very intriguing to realize, "You know, I do things very differently, even if I'm going to ask two dollars for it, than I do when I'm just posting something to a newsgroup." I put an entirely different amount of work into it, I'm much more concerned about my reputation and the comments that are going to be put on this thing. I make tremendous effort to target the introduction to be both persuasive and fair, so nobody will buy it that isn't going to be satisfied with it.

And similarly, I think, when you're on it as a buyer, you recognize that the sellers are thinking that way. The sellers that do not think that way are going to be selected out very rapidly, because if somebody's asking you for $15, a book-type price, you're going to read the comments file. You're going to look at the resumes of the people who put those comments there.

Part of it is just fundamental economics. [AMIX creator] Phil Salin was an economist. He understood economics. He understood transaction costs. He understood the way purchase decisions are made The trend in price in the software business has been down, down, down, down. And we have a means that you can sell software for $2, $5, $10, at a lower transaction cost and a lower distribution cost. The rules limit this, but you could sell software for $50,000, three copies a year, and have a very low transaction cost and a very low support cost. Companies that sell software for that kind of price tend to have large organizations that could largely be eliminated if they could deliver their updates and support and consulting electronically.

These are all things that AMIX is going to be getting into. We're getting a lot of interest in AMIX purely as a fulfillment mechanism, of being able to sell an update. Your update to Product X, Release 4.0, for $10.

Are the AMIX guys also Xanadu guys? I always see them in the same place, so I guess I've got that perception.

No. No. They share a parking lot, of course, and they share a lot of the same intellectual groundings and ideology. But there is no connection between the two companies. They are two independent companies in which Autodesk has unrelated investments.

A lot of the connection was that when Phil started to think about AMIX, he saw Xanadu as the ultimate system that would underlie AMIX, the first system that would have the strength to do all the referencing and linking that he would like to do.

In the early days of Autodesk's involvement with Xanadu, he was a very strong force in causing the deal to come through, getting Xanadu organized. He probably spent more time on Xanadu the first year than AMIX. But we concluded that AMIX did not need Xanadu beneath it. An AMIX with Xanadu beneath it will be something very, very different and much better than what we have today, but what we have now could be built as a conventional program, and it needed to be built as soon as possible without waiting for Xanadu in order to succeed.

I take it you think Windows is pretty important.

I think it is of *surpassing* importance.

What is happening is that workstation-class operating systems are becoming available for the masses. Workstation-class operating systems I really define as a system in which graphics, and soon 3-D graphics, are tightly integrated within the system. It has a modern user interface. It has true multitasking, and it networks well.

When that solution becomes available, the software environment is going to change in a very substantial way. You can certainly say, "Well, what about the Macintosh?" Well, before System 7 the Macintosh was not a workstation-class system. Only with System 7, which I guess a lot of people still aren't using, did the Macintosh become a workstation-class platform. And with Windows NT, we will see the PC become a workstation-class platform.

Suddenly all this capability that people have not been able to afford is going to be available. And it is going to change the way everybody builds their applications, buys their applications, and uses their applications.

I don't know for sure, and at some level I don't care, who wins—whether it's Windows NT, or, should Microsoft stumble, an OS/2 32-bit version. Suppose both Microsoft and IBM stumble, and Sun Solaris for the 486 ends up filling that niche. Or all three of them stumble, and OSF/Motif or something like that becomes a standard. Whoever wins, it's going to happen.

It's as inevitable as anything that I've ever seen in this industry. The benefits are simply too huge, and the costs are going to be negative, really, in the sense that when you go into the stores a couple years from now, there isn't going to be much raw DOS software for sale. It's all going to run under the winner of this operating environment battle.

Any software company that doesn't really understand the true significance of this is not positioned to be a survivor across this transition. You have to anticipate both what's going to happen—make some bet on who's going to win, certainly, in terms of where you spend your time—but most of all recognize what the expectation of the user is going to be. Because the user who has a multitasking, multiprocessor, high-resolution system that's networked to lots of other people is going to be using your application in a very different way than the guy that's looking at a black bozo screen one application at a time.

That means that you have to start making fundamental changes—in how you build your product, in what you put in it, in what capability it provides to the user—that are bets on that occurring. Because if you don't start now you're going to be too late.

Now when that standard is created, we're going to have software that can move upward from all the software that's being built for that environment to systems of workstation class and above. NT is going to run on symmetrical multiprocessors. Sun is just getting out a system that runs on symmetrical multiprocessors.

It's not inconceivable to me that in thirty-six months a machine with fewer than four processors is considered as passé as a machine with no more than 640K of memory on it. After all, the chips don't cost very much, and they're plummeting in price. And if you have software that runs six or eight times faster if you put in six or eight processors, you're probably going to put in six or eight processors, if you're

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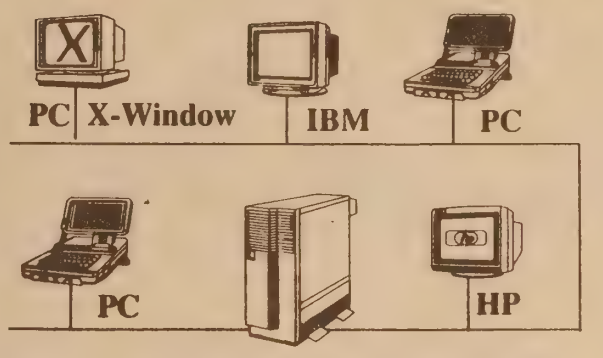

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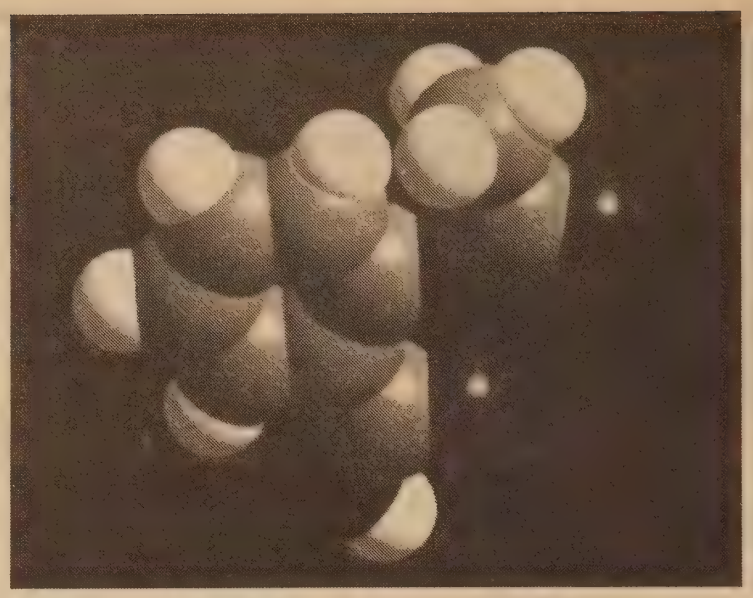
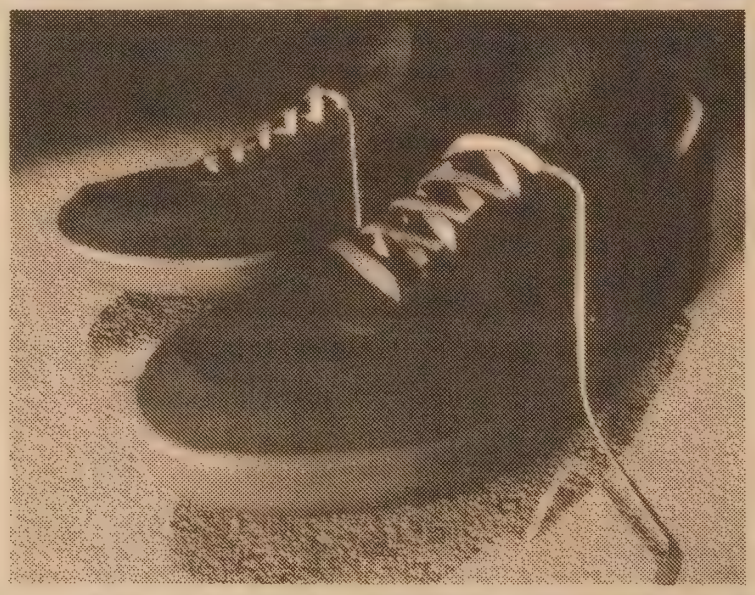
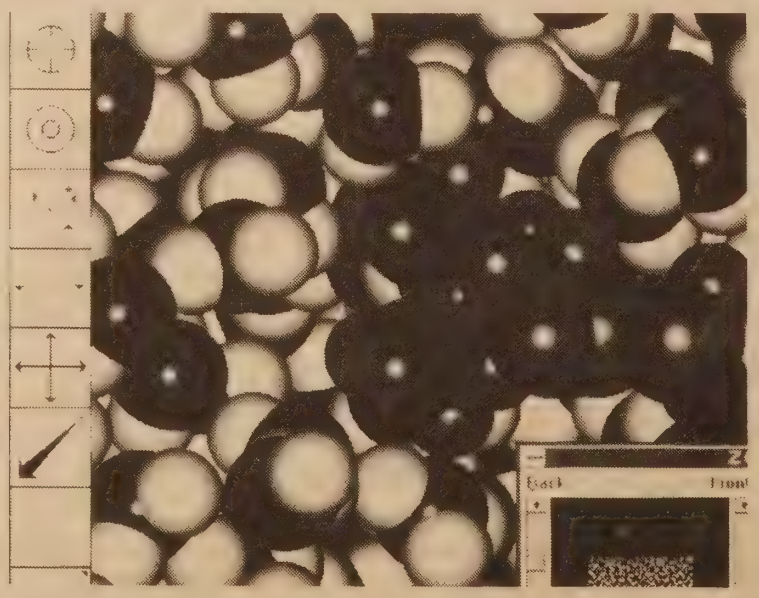






Modeling anything inside a computer: 3D Studio and HyperChem.

interested in going fast.

HyperChem will run eight times faster on an eight-processor machine than it runs on a one-processor machine. The SGI version demonstrates that. We're going to be shipping that one later this year.

Application vendors who wish to play in this environment are going to have to learn to do that. Particularly if, as in the CAD business, you can use any amount of power. We could saturate a machine that was a thousand times faster than anything you can get today, just doing the same kind of stuff we're doing now. So we'd better be able to take advantage of it.

Don't forget the multiprocessor/multitasking aspects of this. I think it's really a very important thing. And all the major players are going to provide it. It's going to be essential.

Everywhere? For what I use my Mac for, I don't see the need for multiprocessing, but will that change?

Well, are you happy with how fast it runs now?

Depends on what I'm doing. For text, who cares? But for PageMaker, I go crazy because it's so slow.

Okay, well, if you go crazy about how slow it is, and the Mac toolbox were running on one 68040 and the application were running on the other, it would immediately run twice as fast, assuming that the breakdown were about half and half.

I just got my 486 this week. I've been using the same 386 20MHz machine for, I guess, four or five years. And for everything I do with the machine except CAD and HyperChem, I was quite happy with how fast it ran. Yeah, it took about seven hours to compile all of AutoCAD, but I only do that every couple of weeks. Besides, it can do that overnight.

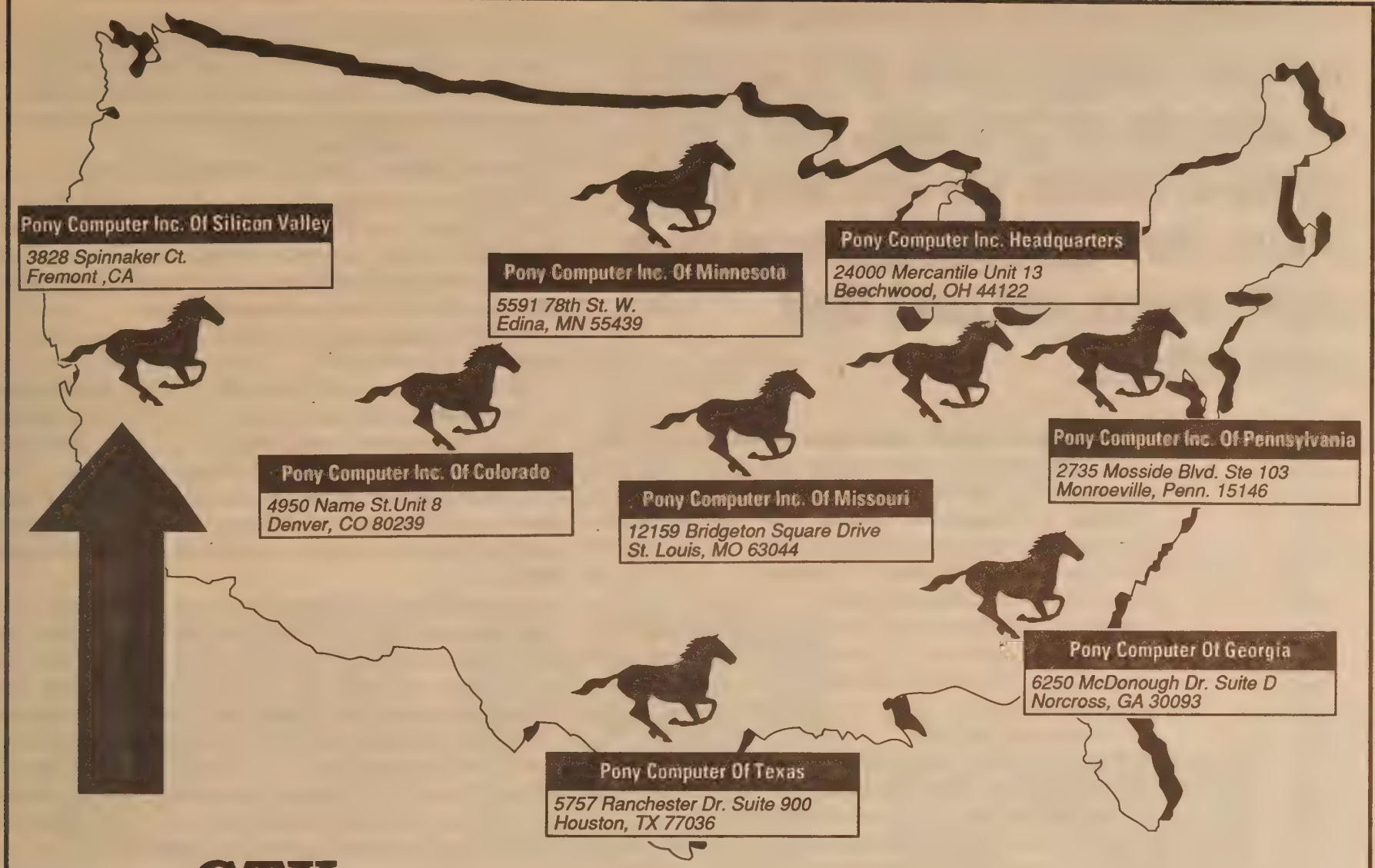
But except when I was really beating Excel to death or something like that, or editing a 175-page document, I was fine. But as soon as I start to do CAD—"Oh, this thing is so *achingly slow!*" All the floating point-intense stuff, huge databases, lots of operations where you're searching through a lot of stuff to try to find things...

I think people are going to be doing things that are fundamentally different as well. But they're not things that you can't think of. It's simply things like photo composition. Photo composition and retouch from your Photo CD. You can use a lot of compute power when you get into the really serious image composition type stuff. Video throws another factor of one thousand at it. When you have a machine that lets you cut and paste moving video, you're going to probably use all the processing you can get, and all the processors you can get, to do that.

The other thing that's happening with these workstation-class environments is that for the first time, applications can live beyond the hardware. I have now had pieces of C code that have run on three different processor architectures from Sun, to which I did nothing other than simply recompile. I started on a Sun 3, 68020. I moved to a Sun 386i, 386 architecture. And now I have a SPARCstation. And I did nothing. I just use the code. I don't even think about it. It's inconceivable to me that as long as there is a Sun, I won't basically be able to take my code and move it along.

Lacking that is something that always seemed to me so foreign about the PC business. Because I grew up as a UNIVAC mainframe programmer. I worked from 1967 through 1978, and actually I did consulting into the '80s, on machines that ran programs that were compiled in 1963. Think about that. Basically children running code that was compiled by their fathers. IBM mainframes have been upward compatible through the years—you have to look at the DOS to OS bump in the '60s as an aberration. Yet here it seems like all your investment is a wasting asset that disappears after twenty-four or thirty-six months.

If you look at the heavy CAD systems, the Cadam, CATIA, ComputerVision, and the rest of the design software that isn't what you'd call CAD—the structural analysis, NASTRAN, Ansys—these are packages that are approaching twenty-five years of age, that have massive investment every year over twenty-five years, of doing more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and more and more. Larger models, better user interfaces. When you make a commitment to something like that, that's a long-term commitment. You and the vendor are taking a very profound step.

Because in engineering, we talk about things that span decades. The Boeing 777 is going to be flying in the year 2050. It'll probably fly till 2075 in the secondary and third-tier market. And they're going to be manufacturing replacement parts for it; they're going to be upgrading it; they're going to be stretching it; they're going to be replacing the avionics and all of this stuff, but that's a design that spans a human lifetime from conception to obsolescence. And you don't want to buy into a design system that's going to disappear somewhere during that cycle.

So there is a somewhat different perspective. This is engineering that we do here. Engineering is unlike a lot of other businesses because when you get a wrong answer people get killed. And when you're educated to be an engineer, you take a very different view of quality and accuracy and so forth, that's kind of indoctrinated in one.

If your spreadsheet gets a wrong number, you may be embarrassed. If your word processor crashes, you're going to be furious. But if a CAD system produces the wrong strength number for a load-bearing member in an aircraft wing, airplanes start falling out of the sky. And that's really, really bad.

Sometimes we test to death. We're accused of really bashing on the quality of the product. But it can't get wrong answers. It's a fundamental thing. You can't do it in this business.

And so, yeah, we do tend to take a view where you have a long-term relationship with your customer. Your customer is sitting there having, in some cases, many employees spend their whole working day putting stuff into your system and storing stuff in your format, and accruing capital. And as long as there is a CAD market, as long as there's an AutoCAD, it's going to read every AutoCAD drawing back to Day One. However different the environment. However different the user interface.

Windows and these other things give applications that sense of immortality. In the sense that once you buy into it, clearly there's going to be an upgrade path.

I think we need only look at the integration of sound, that you can see both in MIDI Manager on the Apple first and in the Windows Multimedia Extensions. It used to be that if you wanted to do anything with sound, it was all hardware-specific. Anything you did was obsolete in six months because the board that you designed it with wasn't made any more.

Now you write something for MIDI Manager on the Mac, you write something for Windows Multimedia Extensions, and you know it's basically going to work for a very long period of time. Because the drivers have been decoupled from the application.

One of the good things about Autodesk as a company, it's always seemed to me, is that there's always been the perception at key levels that the company's crown jewels weren't some code sitting on somebody's hard disk somewhere, the crown jewels were in the heads of its people.

Mm-hm.

I think, in a software company, you only really have two assets. You have your position in the market and your installed base, and you have what's in the heads of the people who work for and with the company. Because what you're selling today is not going to exist in thirty-six to forty-eight months.

I think everybody in this business totally rebuilds their product, even though it has the same name, over that period of time. You don't start from scratch, you simply replace. If you start replacing 20–30% every release, before long you have a totally new product. And what determines what that product is resides in the heads of the people who are working on those new releases right now.

It is of surpassing importance to make sure that you have the best people you can possibly get.

The nature of a business is inextricably related to the constraint upon its growth. In other words, what is the constraint that keeps a company from growing faster, doing more, whatever. That varies from industry to industry. In a capital-intensive industry, it's how much money you have and how much money you can raise. Some businesses are natural-resource-limited—how many trees do you own? How many trees can you cut down a year, if you're a paper company.

The software business is constrained by talent. Human talent. How many talented people can you get to work for your company? How many talented people can you develop from people that come into the company and wish to be trained? And that's not just programmers, by any sense. It's people throughout the organization.

You need talent everywhere in the company—it's that broadly based talent, of being engaged in the industry. In the software business, you're not investing heavily—we didn't even own a forklift for the first five or six years. There's no capital equipment. Even the PCs don't cost much—they cost like a guy's salary for a month.

You're investing in people. And if you don't invest in developing the people you have, in getting the right people, you're going to fail. It's just that simple.

This isn't Marin County airhead mush, it's just good business. If your asset is people, and you don't invest in the asset, you're crazy. It's like you're running a railroad and you don't invest in the rails—after a while, the trains start running off. It's just stupid.

So I think you simply have to do that. And if you make that investment, then the company can grow over a period of time and continue to succeed.

I think a lot of the problem that you have in business, and also in politics and so forth which I'm *totally* not interested in, is that it's always easy to neglect maintenance right now. The impact is always deferred well past the current horizon, or perhaps even somebody's retirement date.

If the railroad starts to get in trouble, "Well, let's just stop fixing the tracks." And you know, for the first three years nothing really bad happens. And then, unfortunately, that guy retires and a new guy comes in, and the trains start running off the rails, and "Oh gee, it's going to cost *$4.5 billion* to replace all the tracks on the railroad, and we don't have that much money." And then you're stuck.

Similarly, if you take a typical software company, you can fire all the programmers, and probably for twenty-four months nothing goes wrong. You make all kinds of money. And then all your competitors come out with new releases and you say, "Oops! Guess we should have had a new release..." And then you're stuck.

It's just sound business, in a business that is talent-constrained, to do everything you can to attract and retain the talent that you have. Because that's really all you have.

Given that you can find them, what tends to keep talented people interested and involved?

I think one thing that people don't pick up when they talk about Autodesk—because Autodesk kind of had this image, at least, of being a very far-out-on-the-leading-edge kind of company, in some ways—is that of all the guys who founded Autodesk, we were all maintenance

Continued on page 248

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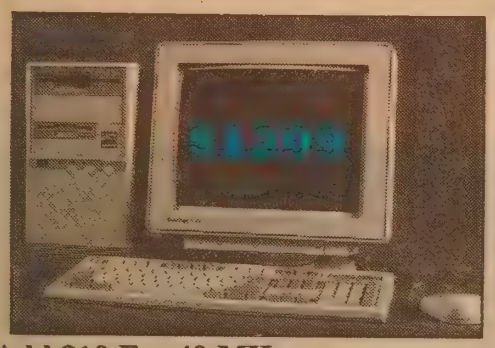

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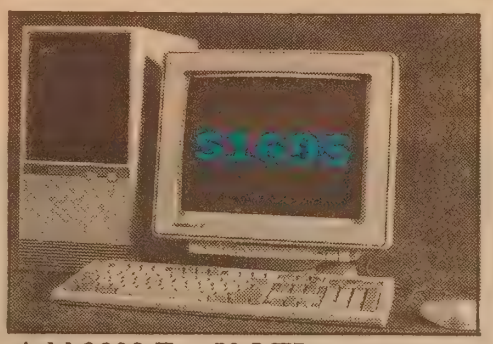

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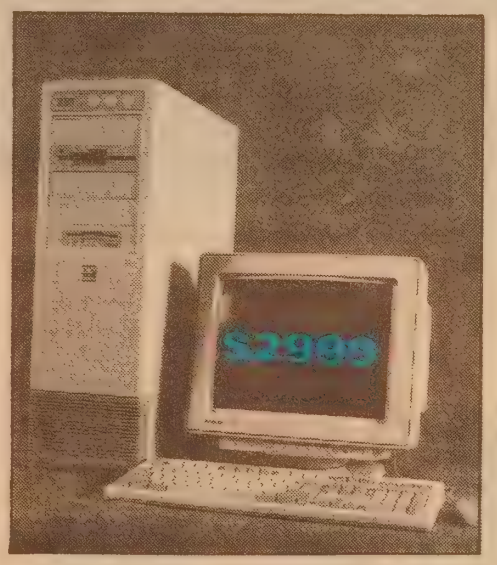

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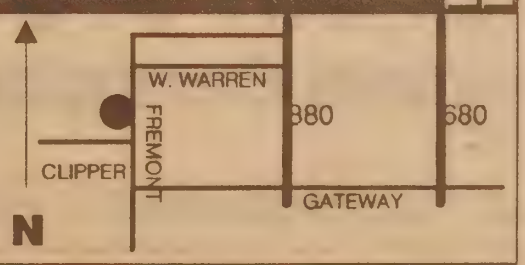

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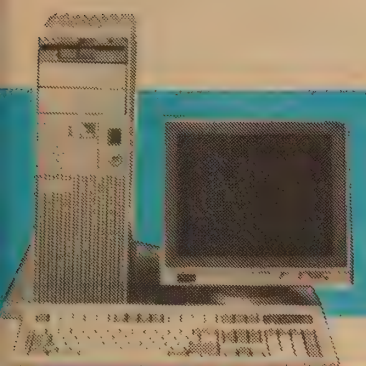

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DFI Mouse (3 Button, Micro Soft Compatible)	35
AT Deluxe Case	48
Mini Vertical Case w/Power Supply	65
Mid Tower Case w/Power Supply	95
Full Tower Case w/Power Supply	125
Colorado 120 MB Tape Back-Up	205
Colorado 250 MB Tape Back-Up	275
RAM DIP/SIPP/SIMM	CALL

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- Company, Government P.O.'s Welcome
- UPS Shipping Daily

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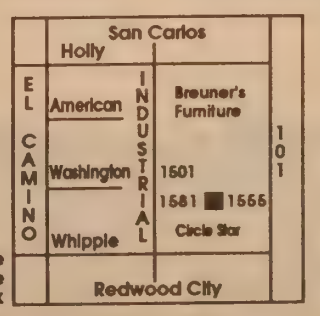
Co. Term on credit approval

Welcome to visit our new 4500 Sq. ft. showroom! Computers, Monitors and Printers are now on display!



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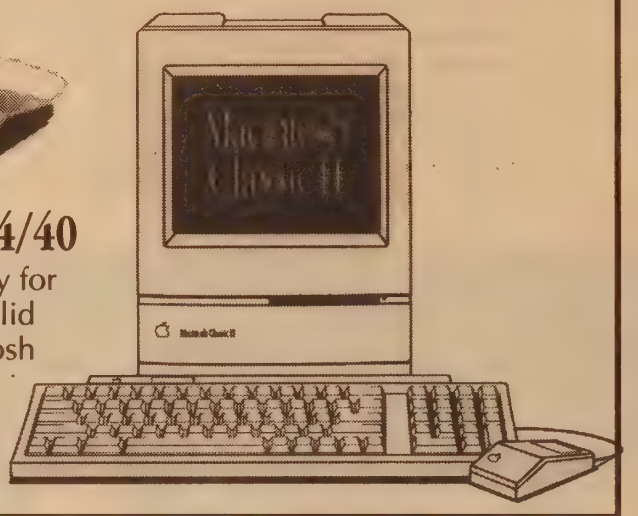
MACINTOSH® HIGH PERFORMANCE

Classic® Macintosh® Products

Apple® Macintosh® Classic® 4/40

The Apple® Macintosh® Classic® is the most affordable Macintosh and the ideal entry level personal computer for students and/or small businesses. 4 MB RAM 40 MB HD

1099.

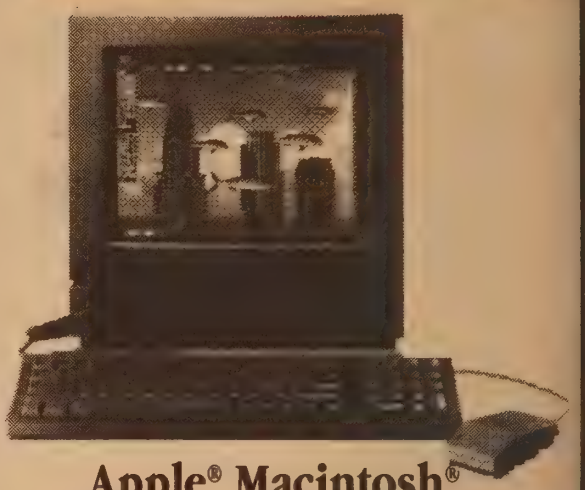


Apple® Macintosh® Classic®II 4/40

Combines performance and affordability for the budget minded business person. Solid performance to run virtually all Macintosh compatible software. 4 MB RAM and 40 MB HDD.

1249.

Modular

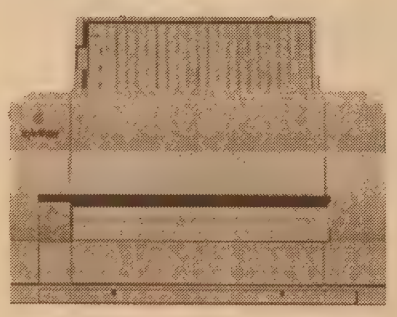


Apple® Macintosh® LC II 4/40

The just released Macintosh® LC II combines color with a virtual memory capability that lets you use more applications simultaneously. A great mix of solid performance and affordability. 4 MB Ram/ 40 MB HD. System 7 capable *Monitor extra.*

1359.

Apple® Macintosh®

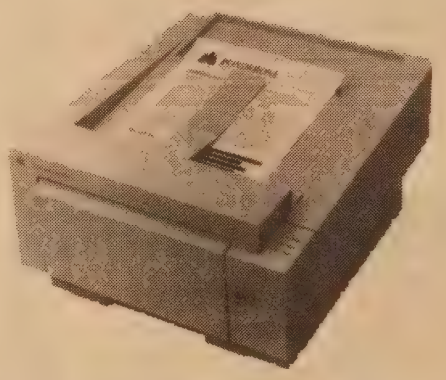


Authorized Dealer
Authorized Service

Print in Style

The Apple® StyleWriter® brings outstanding laser-like quality results, quiet operation, and space saving compact design for only a fraction of the cost of a laser printer. Compatible with all Macintosh® computers.

349.

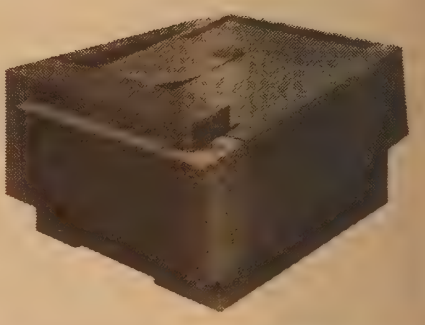


Authorized Dealer
Authorized Service

Apple® Personal LaserWriter® LS

The new personal LaserWriter® LS printer is the most affordable personal laser printer from Apple®. It's compatible with all Macintosh® computers.

849.



Apple® Personal LaserWriter® NT

The Personal LaserWriter® NT offers individuals and small workgroups affordable, high-quality PostScript® laser printing in a compact design. This printer has a built-in AppleTalk® interface for Macintosh® computers.

1395.

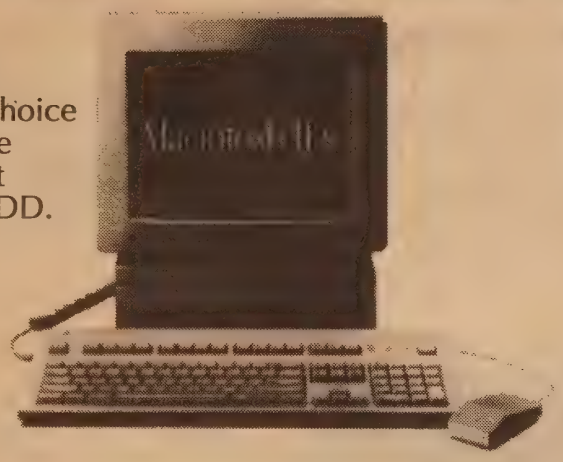
WHOLE EARTH ACCESS

FAMILY OF PRODUCTS

Macintosh® Products

Apple® Macintosh® IIsi

This computer is an excellent choice for business, education or home users. Flexible monitor support built-in. 3 MB RAM, 40 MB HDD.
Monitor and keyboard extra.



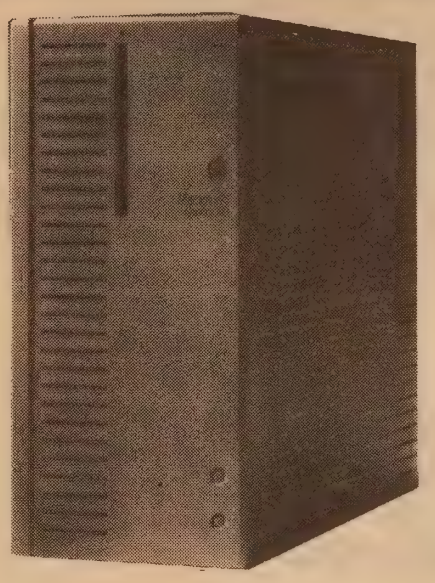
Apple® Macintosh® IIci

- Power with room to grow
- Excellent choice for business
- 5 MB RAM

Monitor and keyboard extra.

Limited Availability

Macintosh® Quadra™

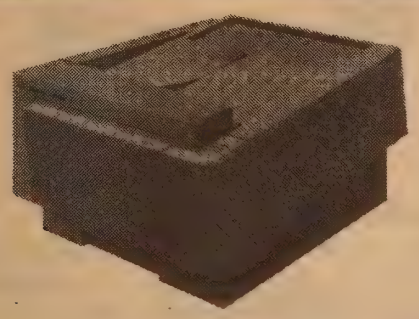


Apple® Macintosh® Quadra™ 700

- Highest performance desktop Macintosh®
- Excellent choice for business professionals
- 4 MB RAM

Monitor and keyboard extra.

Printers

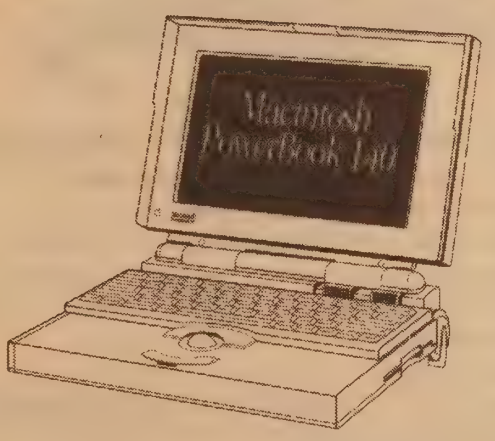


Apple® LaserWriter® NTR

This new Apple laaser printer is one of the fastest in its price range, thanks to an exceptionally fast RISC-based controller card, built-in TrueType support, and level 2 PostScript. Dubbed a "milestone" by *MacWorld* magazine. Similar to illustration.

NEW

PowerBooks



Apple® Macintosh® PowerBook™ 140 4/40

- Macintosh® power with notebook convenience
- Runs virtually all Macintosh® software
- 4 MB RAM, 40 MB hard drive

2379.

NOTICE
Due to the unparalleled demand for Apple® Macintosh® computers, we regret that availability of all Apple® Macintosh® systems is subject to change without notice.

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SAN MATEO Fashion Island Shopping Center 578-9200
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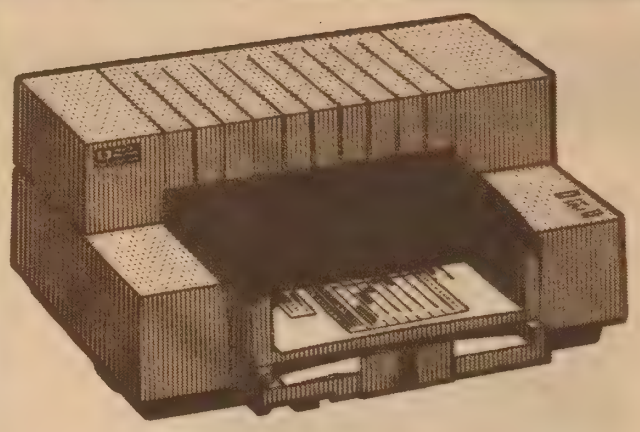
SACRAMENTO 3130 Arden Way (916) 489-1000

HP Leads the Revolution in Resolution

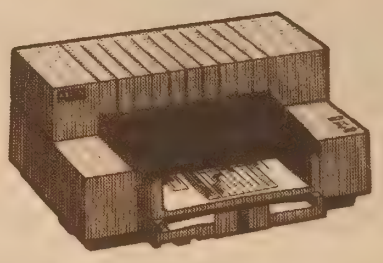


HEWLETT PACKARD

HP DeskWriter Printer

Hewlett-Packard's DeskWriter printer, now AppleTalk® compatible, brings laser-like quality to the Macintosh® line.

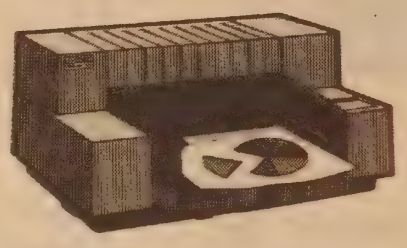
399.



HP DeskWriter C Printer

The new HP DeskWriter C adds color capacity to an already famous laser-quality black output. It's compatible with popular Macintosh® software and your budget.

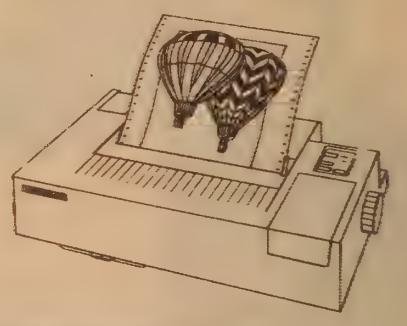
749.



HP DeskJet 500C Printer

• Affordable laser-quality printing• 300-dpi color printing on plain and transparencies • Supports leading software applications including Windows 3.0 • 3-year limited warranty

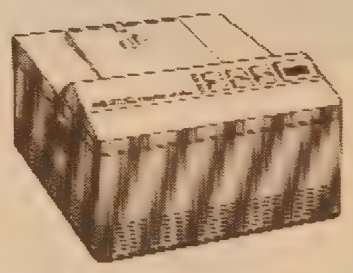
749.



HP PaintJet Color Graphics Printer

• High quality color charts & graphics • PC or Macintosh® compatible • Wide range of software support.

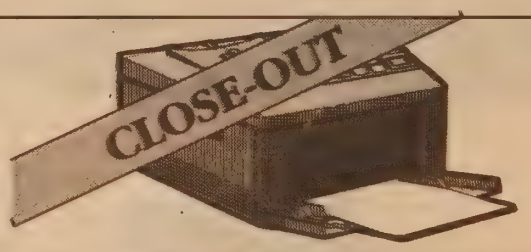
829.



HP LaserJet IIP *plus* Printer

• High-quality, 300 dpi text and graphics • Compact, desktop size • Prints 4 pages per minute • Compatible with all major software packages • Optional 250-sheet paper cassette for dual-bin printing

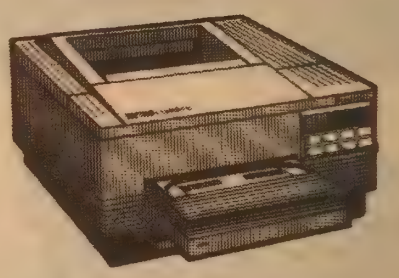
799.



HP LaserJet IIIP PostScript Printer

This Laserjet is a perfect match for small businesses. It's compact but powerful, with great paper-handling features and faster print speed than other printers in its price range. The IIIP also features built-in type scaling and upgradeability to PostScript for PC and Macintosh.

LIMITED TO STOCK ON HAND



HP LaserJet III Printer

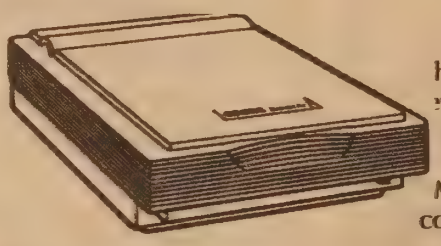
• Now Hewlett-Packard LaserJet Printers are PC or Macintosh® compatible • AppleTalk® compatibility with optional interface • Dependable HP performance

HP ScanJet ScanJet II P

Scan images at 300dpi resolution, or scan text using software and stop typing it in. Exceptionally easy to use, and it works with most popular scanner software packages.

AT VERSION
Price includes interface

895.



HP ScanJet IIc

he new HP ScanJet IIc gives you 256 evels of gray or 24-bit color professional quality documents. Supports IBM AT-compatible PCs, MicroChannel or Macintosh® personal computers.

Starting At **1495.**

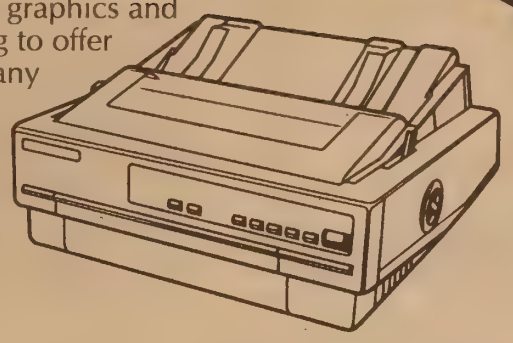
WHOLE EARTH ACCESS

EPSON®

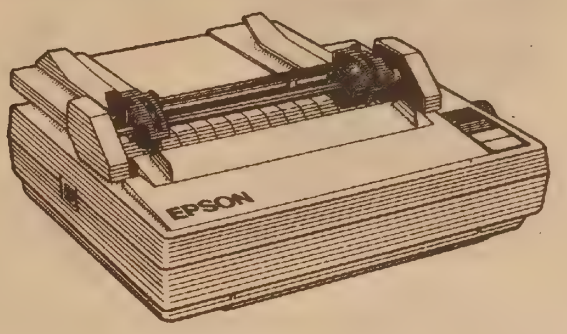
LQ-570

This new 24 pin printer utilizes scalable fonts, enhanced graphics and advanced paper handling to offer more performance than any printer in its class at an affordable price.

259.



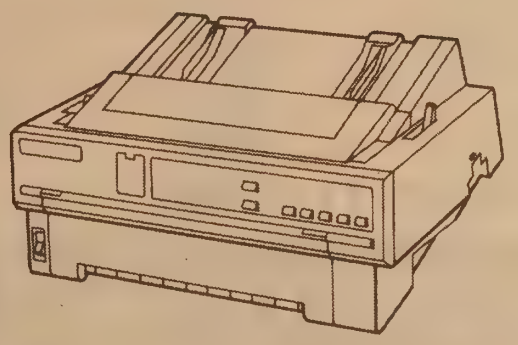
FREE Epson Approved Parana Ribbon With Every Printer Purchase



LQ-870

This new 24 pin printer is a major step forward in printer technology with high speed, and high performance that sets a new industry standard for quality with scalable fonts.

469.



LX-810

The LX-810 gives you high-resolution graphics, 200 character per second in the superdraft mode, and 30 cps in near letter quality. SmartPark prevents paper loading hassles.

159.

LQ-1170 Wide Carriage Model.....615.

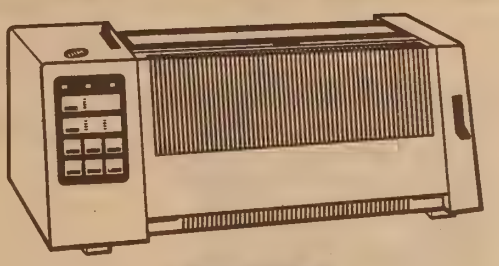
NEW PRINTERS FROM IBM®

IBM® PPSII 2380

IBM introduces 2 new 9 pin printers that can print crisp, six -part forms and thick paper stock with no problem using straight paper path technology. Solid and reliable, these printers perform flawlessly.

2380 Narrow Carriage .....315.

2381Wide Carriage.....455.



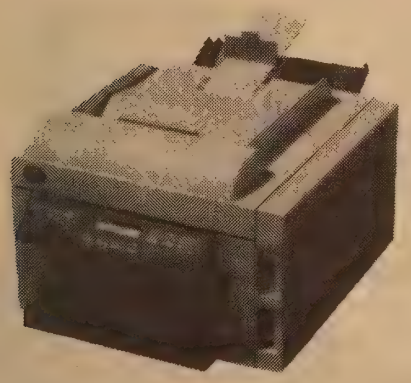
Authorized Personal Computer Dealer

IBM® PPSII 2390

IBM introduces 2 new 24 pin printers for letter quality printing at high speed. Durable and reliable, these printers feature a straight through paper path with multiple feed options.

2390 Narrow Carriage .....325.

2391Wide Carriage.....465.



IBM® LaserPrinter 6

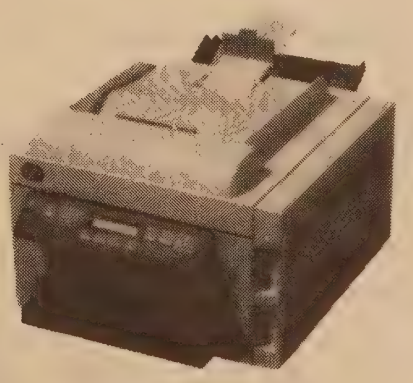
6 pages per minute

Model 4029020

1485.

IBM® LaserPrinters 6 & 10

At 6 or 10 pages per minute with Print Quality Enhancement and Scalable Fonts, these printers outperform the rest. Paper handling includes a 200 sheet input tray with optional 500 sheet drawer and 75 piece envelope feeder. When you add the optional PostScript® and 4 MB of memory this printer provides the most affordable 600 x 600 dots per inch technology available today. HP PCL4 compatible and optional PCL5.



IBM® LaserPrinter 10

10 pages per minute

Model 4029030

1785.

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BRING IT ALL BACK HOME

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IBM® PS/1™ 386SX

The new IBM PS/1 386 SX achieves the exceptional. A home machine with the power of a business model, this computer operates at 16 mhz with 2 MB's of RAM. A 40 MB or 80 MB hard drive stores all your essential data. Comes complete with VGA PhotoGraphic™ color display, keyboard, mouse and built in 2400b modem. Plus you get IBM DOS, Microsoft Works® and 3 months FREE Prodigy for on line home shopping, banking, travel arrangements and more.

LIMITED SUPPLY

Now Whole Earth has OS/2!

The IBM software development team in Boca Raton, Florida burned the midnight oil to bring you this new standard in system software. The first officially IBM-developed system for personal computers, OS/2 is an actual graphic point-and-click operating system, not just an add-on graphic environment. It features lots of online help, superior network and relational database support, and the built-in ability to run several DOS and/or Windows applications at once, as well as cut and paste data between both kinds of software. Stop by Whole Earth and try out OS/2 2.0. You'll never look at your computer in quite the same way.

NEW LOW PRICES ON ALL IBM

Authorized Personal Computer Dealer

IBM® PS/2® N51sx

The latest entry into the notebook arena from IBM is right in step with key trends of the 90's: small, portable, and powerful with a 386sx-16 MHz processor and a 32-gray scale VGA LCD screen linked up with the familiar IBM keyboard. It's network compatible to talk to your home office, and can accept a fax/modem and up to 10 MB of RAM. Pictured laptop is similar to original.

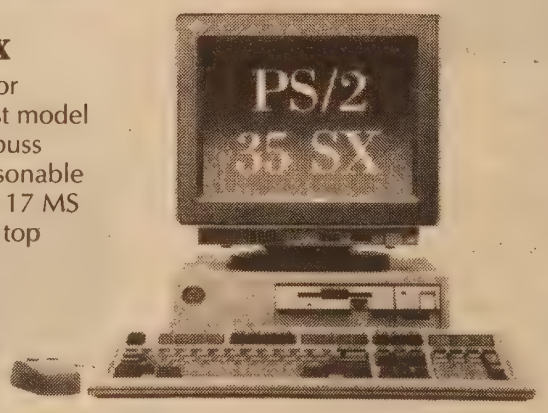
1999.

IBM® PS/2® 35sx

Based on an 80386sx processor operating at 20 Mhz, this latest model IBM PC offers the classic ISA buss allowing easy upgrades at reasonable cost. 2 MB of RAM and a fast 17 MS 40 MB IBM hard drive insure top performance. VGA on board.

Monitor extra.

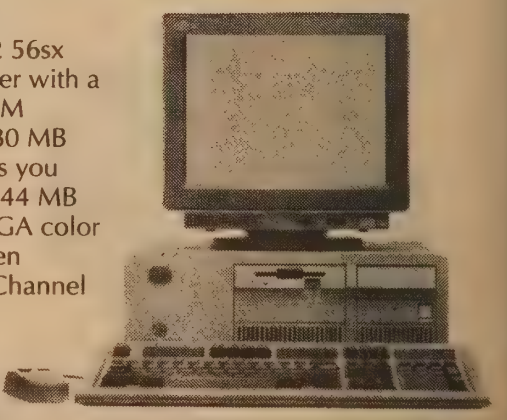
1395.



IBM® PS/2® 56sx

New for spring 1992, IBM's PS/2 56sx will help you get more done faster with a 386sx-20 processor, 4 MB of RAM (expandable to 16) and a 40 or 80 MB HD. Its 2.88 MB floppy drive lets you store twice as much data on a 1.44 MB diskette, and enhanced 16-bit VGA color graphics mean less wait for screen redraw. Compatible with MicroChannel upgrades.

NEW



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Purchase the Award Winning Toshiba T2200SX Notebook and get a Megahertz Pocket Fax/Modem for only $99.*

New LOWER Price!

Now featuring MACRONIX Fax Modems for TOSHIBA

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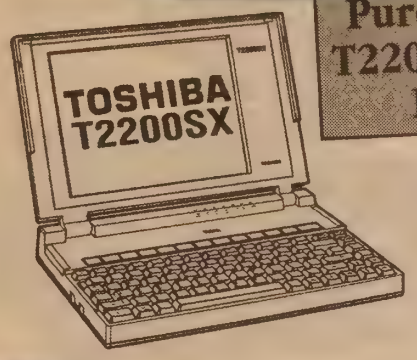


Toshiba T2200SX/80

Pro features like a 16-grayscale VGA display, 20 MHz 386SX processor, an 80 MB hard drive, and 2 MB RAM (expandable to 10) are always great, but especially so when they weight just 5.5 lbs.

i386 is a trademark of Intel Corporation. * Plus applicable state sales tax and $7.50 for shipping and handling. See stores for details.

Toshiba T2000SX/40

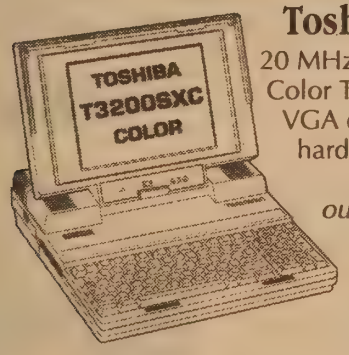
- Toshiba's most powerful notebook computer
- High performance—386SX™ processor
- Super ergonomics—only 6.9 lbs.

Toshiba T2000SXe/60

The Toshiba T2000SXe/60 offers advanced features required by business and professional power users. Time now to replace your desktop.

All Toshiba computers subject to availability.

TOSHIBA DESKTOP REPLACEMENTS



Toshiba T3200SXC

20 MHz 80386™SX CPU. Color TFT-LCD active matrix VGA display. 120 MB hard disk drive.

See one in our Berkeley Store.

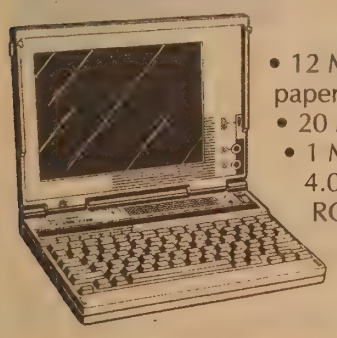
LIMITED STOCK

TOSHIBA T6400DX/SX

• Choice of 33 MHZ DX OR 25 MHZ SX i486™ CPU • 1 Full Length 16-bit ISA expansion slot • 16 gray scales VGA gas-plasma display • 4MB RAM, expandable to 20MB • 200MB or 120MB hard disk drive • Ergonomically-designed 101-key detachable keyboard

LIMITED STOCK

TEXAS INSTRUMENTS



TM2000

• 12 Mhz 80286 • VGA paper-white LCD display • 20 MB hard drive • 1 MB RAM • DOS 4.01 and laplink in ROM

999.

EVEREX

"Deskless" Computing

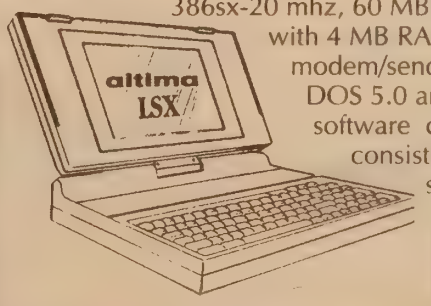
NEW LOW PRICE

Low in weight and high in power the Tempo LX 20 Mhz 386sx notebook frees you from the bonds of your desk. Comes complete with VGA graphics, 1 MB RAM expandable to 5 MBs and a 60 MB hard drive.

1899.

altima LSX

Award Winning



386sx-20 mhz, 60 MB HD with 4 MB RAM, 2400b modem/send fax, MS-DOS 5.0 and special software collection consisting of six titles.

1999.

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COMPUTER SYSTEMS

PCPartner XI™
By Leading Technology Inc.

386SX-16

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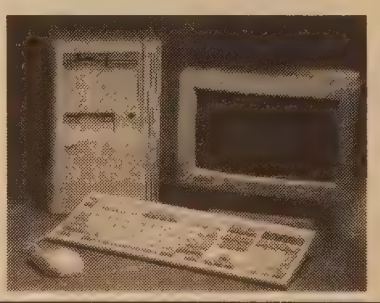

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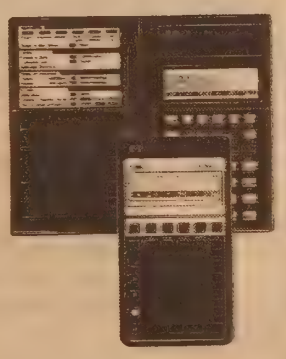

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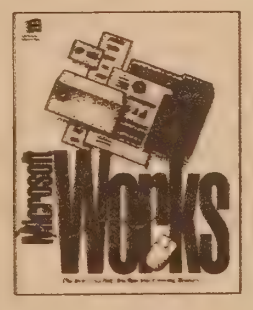

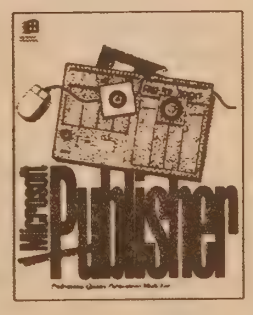

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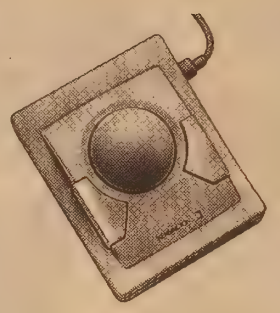

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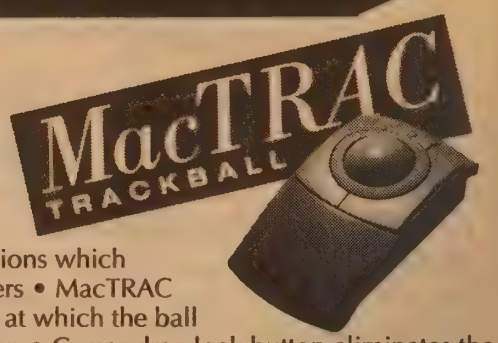

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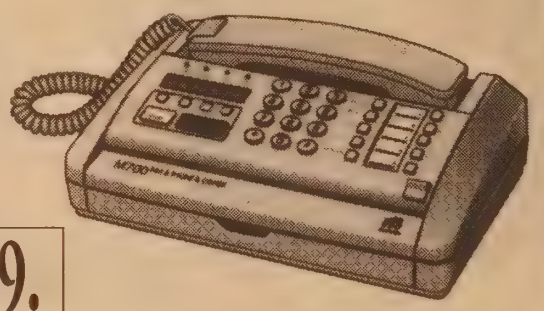

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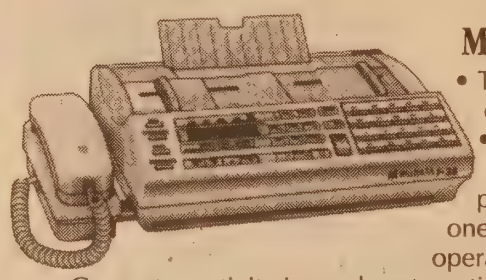

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WHOLE EARTH ACCESS

Windows 3.1: Boon Or Bane?

THUMBS UP

BY WOODY LISWOOD

To upgrade, or not to upgrade?

If you use Windows, you should upgrade. It's quite simple. This is a better Windows, and you should be using it. If you wonder whether you should *finally* upgrade to Windows from DOS, this is a good time to do it.

NEW, IMPROVED ERROR MESSAGE

Like any other operating system (which is what I consider Windows), this one's new release attempts to fix real or perceived problems with the older version.

The most welcome fix springs from the most common irritant from Windows 3.0: the dreaded Unrecoverable Application Error. Whenever that message appeared—apparently as the result of an ill-behaved application's attempt to use the same memory area as another program—anything could happen. Sometimes you dropped back to DOS, sometimes you returned to Windows, sometimes you locked up and needed a soft boot, and other times a cold boot crash occurred.

Under 3.1, the UAE has changed to an Application Error, which in turn generates a GPF (General Protection Fault). Now, when a GPF occurs, you are notified, given a memory address where the problem occurred, and told what application caused the problem. (Of course it can't *possibly* be Windows itself that caused the problem...) Additionally, you are given a choice of continuing, or returning to the Program Manager, or back to the application.

About 95% of the UAE problem appears to be gone, but the GPF is not perfect—I've got a couple of applications which cause a crash requiring a cold boot. Windows 3.1 literature says it will run everything that ran under 3.0a. Maybe so, but some of them will GPF on you, anyway.

Which, of course, looks like some major bucks for applications developers who will now release 3.1 compliant versions of their software.

NEW, IMPROVED OTHER STUFF

So why upgrade?

Well, the program feels and runs faster. The number of available serial ports has been changed from two to four.

The File Manager has been changed so it's easier and more intuitive to use—it displays two windows and lets you drag and drop. When you delete a directory, for example, a dialog box now asks you if you want to OK each individual file for deletion, or just delete everything. This streamlines the process—no more returning to DOS to get things done fast. You may no longer require one of the

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Continued on page 113

THUMBS DOWN

BY PAUL HOFFMAN

Yes, it's finally here! The long-awaited, long-hyped release of Windows 3.1! Millions of people will certainly upgrade their copies of Windows 3.0 to Windows 3.1 automatically without a second thought. These people probably need to have the most current of everything, or they can take advantage of some of Windows 3.1's new features.

But many more millions will wait and see whether or not they want to upgrade. They are rightfully skeptical of the claims made by Microsoft and parroted in the computer press about the wonderful advantages of 3.1. They may eventually upgrade, they may not.

Few Windows applications will require 3.1 (any vendor that does so is a fool, given that even Microsoft doesn't believe that everyone will upgrade).

So users ask, "Is it really that much better?" "Will the upgrade be painless?" "Will all my current applications work the same, or even work at all?" "Is it really as easy as Microsoft says?"

One answer for all these questions: "No."

BIG IMPROVEMENTS?

It is somewhat humorous that much of Microsoft's marketing for Windows 3.1 is a direct slash at Windows 3.0. Essentially, Microsoft has taken some of the features that were stupid or slow in 3.0 and made them smarter or faster. How much of a difference that will make to you depends on how much you use particular parts of Windows and what hardware and software you've bought in the last two years to make Windows 3.0 more livable.

The biggest improvement is that the File Manager is not as inane and lethargic as it is in 3.0. The new File Manager now comes up on my machine in a second or two instead of twenty. However, many people gave up on the Windows File Manager a long time ago and have bought commercial or shareware equivalents. The new File Manager in 3.1 is not much better than most of those.

The next most touted improvement is that Windows 3.1 is "faster." On many systems with not much RAM, it is indeed faster. If you have more than 4MB of RAM, you may not notice much speed difference because much of Window's new speed is in faster swapping. If you have 8MB of RAM, you may not see any speed difference at all, particularly if you use Windows programs that don't access the hard disk much. Even if you use disk-bound programs, if you had a good disk caching program, Windows 3.1 won't feel that much different.

The winner of the "Strangest Marketing Slogan" award is "Windows 3.1 crashes less often." Oh, be still my beat-

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Continued on page 113

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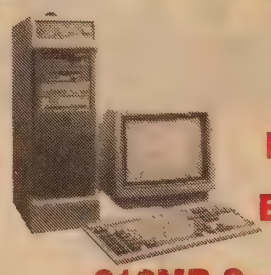

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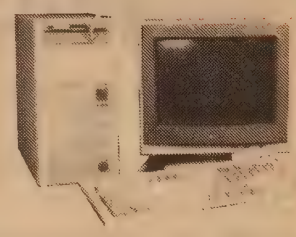

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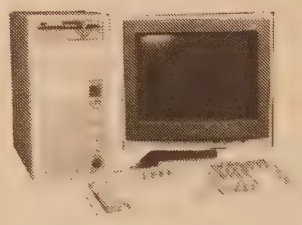

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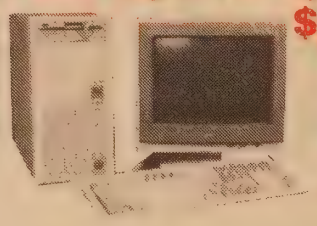

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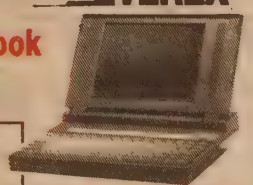

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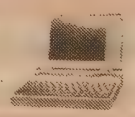

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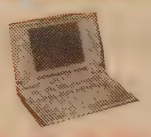

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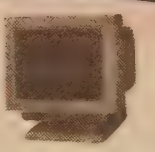

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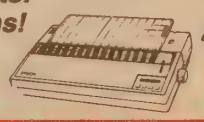

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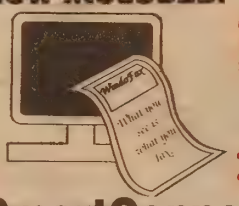

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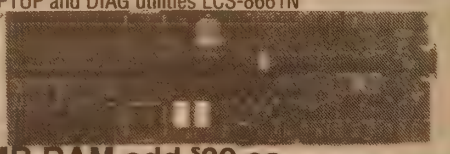

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Thumbs Up... Continued from page 109

better file managers such as Abacus or Norton just to manage files. (Though you might still need some of their other features.)

Another major enhancement in 3.1 is the addition of TrueType scalable fonts. Windows 3.1 comes with many of these fonts, which scale to the screen and your printer. Microsoft is also selling some add-on packages with even more TrueType fonts.

The TrueType technology is also compatible with Adobe's ATM. I found, though, that I finally took ATM out of the system and just run with my standard PostScript fonts and the TrueType fonts. I *love* the optional Lucida fonts, and now use them almost as much as I use the PostScript fonts.

If you're running multimedia, 3.1 comes with a new set of drivers. I initially loaded 3.1 and found that nothing would work. Then I noticed in the documentation that Microsoft recommends installing 3.1 *over* your existing multimedia Windows setup. I did, and everything worked as expected.

You get a Media Player, which lets you control the different types of sound files—you can play MIDI, WAV, or audio CD-ROM. The Sound Recorder can play, edit, or record sounds in the WAV format. I now have messages from Captain Kirk and Arnold linked to various Windows operations using a new Sound option in the Control Panel. Using the OLE capabilities lets you link these sound files to other files.

If you've previously customized the load and run commands in the WIN.INI file, 3.1 makes it easier for you by creating a special ground called STARTUP. Any program icon you put in that group loads when you start 3.1. I put in DRWATSON, a Windows Debugger triggered whenever the GPF activates, which creates a text file describing the state of 3.1 when the GPF occurred. It comes with 3.1, but is not loaded automatically. If you start getting GPF problems, your application developer may want you to send the DRWATSON LOG file to them.

Smartdrive has also changed—it no longer loads as a device driver through the CONFIG.SYS file, but as a TSR through the AUTOEXEC.BAT file. It appears to be faster than before and now caches reads as well as writes.

The new version of Windows offers a smarter Installer, which recognizes your old groups and WIN.INI options and will preserve them. It also automatically adds much more to the control panel so that you can access all the different vendors' setup utilities without having them scattered around in other groups. It looks to see what DLLS are there each time you open up the Control Panel, finds the correct icon, and displays that program for your use.

Windows 3.1 now comes with a Screen Saver. While it doesn't have as many neat screens as, say, After Dark, it does have some which are fun to watch.

If you can't remember what all those high order ANSI characters are, or what keyboard key to press to get a certain symbol, you can now run a character map that shows the available characters for any selected font. Copy it to the clipboard, then copy back into your document when you want the copyright symbol or that special Lucida Arrow.

The Print Manager appears to have been improved. I don't notice much difference between it and my favorite print cache so I've switched back to letting Windows do all the printing for me.

Object Linking and Embedding is easier now. Windows provides a standard set of libraries, interfaces, and protocols to allow applications to exchange data objects. This means you can create a chart in one application, insert it into another application, update it back in the source document, and have it automatically updated in the second. That's all there is to it—nothing special to do for most applications.

The virtual memory manager, called "swapfile" in 3.0, has really been improved. Now, selecting an option through the Control Panel, you can create a virtual memory segment on your disk at any time without having to boot Windows in Real Mode.

One little feature which improves the Program Manager makes my life somewhat easier. Icon titles now wrap under the icon, rather than extending forever in a single line and overlapping each other.

Printing is faster, but may require some major changes in the way your documents are handled if you use PostScript. The driver name has been changed to APPLE IINTX from POSTSCRIPT. This means that each of my PostScript documents gives me an error message, then switches to the default printer. You must reselect the printer, then save to get to the new name.

If you use the Ctl-Alt-Del reboot sequence while running Windows, you'll find it harder now—you get a message asking if you really want to do this. You must do the Ctl-Alt-Del twice to bypass this trap and get your soft reboot.

Not only do you get lots of new icons, selecting them is now much easier as well. When you go to Properties, and select Change Icons, you get a small screen across the bottom of the dialog box and the icons scroll through, showing about five at a time. Point and shoot at the one you want.

The Windows 3.1 documentation goes on at length about the support for pen-based Windows. I did not test that.

UNDOCUMENTED FEATURES

Although not documented by Microsoft, there are still other goodies and "eggs" which abound in Windows 3.1. For example, you can now cheat in Solitaire. When you have finally reached the end of your rope, and can not get to the card you need because it is *always* underneath some other card, click on Undo, then do a Ctl-Alt-Shift when you click on the deck. You are now switched to single card mode.

One egg lurks in the Program Manager Help Menu. Go to Help, click on About. Hold down the Control and Shift key and double click on the colorful Windows Icon. Exit Help. Return to Help. Return to About. Ctl-Shift and double click again. Pretty, eh? Exit Help. Return to Help. Return to About. Ctl-Shift double click again. See what happens.

There appear to be eggs of this type hidden in many Windows applications. If you know of any, send them to me for testing and inclusion in future articles. ■

Thumbs Down... Continued from page 109

ing heart. From first indications, you may not see fewer crashes unless you run MS-DOS programs from within Windows and/or you load badly behaved TSRs when you boot your system.

To be sure, there are some definite improvements, and any speed increase is desirable. The new TrueType printer driver is much faster on non-PostScript printers like unadorned Hewlett-Packard LaserJets or LaserJet clones. The help files in Windows 3.1 are much better and more complete than 3.0. Better stability certainly counts. But for the average user, these are not necessarily enough to compel an automatic upgrade.

WORKS AS ADVERTISED?

One of the features that has been getting strong press in the last six months is the new SETUP program that comes with Windows 3.1. If you are upgrading from Windows 3.0, you only need to answer one or two questions and away you go, or so the pre-reviews said. Unfortunately, those glowing predictions turned out to be wrong when the final version was released. (All information in this article comes from using the final, shrink-wrapped version only.)

Getting the SETUP program going was indeed easy. That program looks at your current Windows 3.0 configuration and uses that for configuring 3.1. The first problem that almost everyone will come across is that there are dozens of things in your CONFIG.SYS or AUTOEXEC.BAT files that you must remove before running SETUP. For example, if you are running the Norton Utilities (one of the most popular utilities available), you must disable erase protection and caching before continuing with SETUP.

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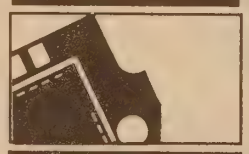

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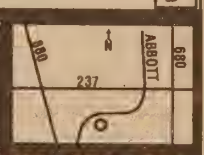

One of the most frustrating parts of using SETUP is that the program tells you what you are doing wrong but doesn't bother to tell you how to fix it. The simple solution is to remove the offending programs from your CONFIG.SYS or AUTOEXEC.BAT files, but then you have to reload them after Windows 3.1 is set up. It would be much better if Microsoft said something like, "to temporarily turn off the program during setup, give the command EP/OFF." Instead, you are directed to a text file called SETUP.TXT that is one thousand lines long and lists every possible problem that SETUP might have.

Reading that file points out Microsoft's arrogance about anything not produced at Microsoft. The SETUP program has problems—with Compaq computers running MS-DOS v5 if you don't have your CONFIG.SYS file just right, with the dozens of graphics boards based on the TIGA chip that people bought so that Windows ran faster, with dozens of other graphics cards, and with popular programs such as Stacker and third-party cache programs. In addition, you must turn off any automatic virus checkers while running SETUP, a step that many are loath to take given the recent PC virus scares. Instead of making SETUP work with these program, Microsoft makes you do its work for them and deal with the problems yourself.

Although it doesn't tell you this, Microsoft really wants you to remove the offending programs from your CONFIG.SYS or AUTOEXEC.BAT files, not just turn off the features. If you leave a cache program such as Norton Cache in your CONFIG.SYS file and run SETUP, SETUP will add Microsoft's cache program SMARTDRV to your AUTOEXEC.BAT file anyway. No sweat, you say, just edit it out. Unfortunately, that's not the case. Because SmartDrive defaults to caching disk writes and it interacts badly with your current caching program, there is no way to edit your AUTOEXEC.BAT file and have the edits actually be added to the file. Flushing SmartDrive's cache doesn't work if there is another cache program running at the same time. If SETUP had been smarter, it would have removed the other program or not install SmartDrive. (The only solution to this problem is to boot off of a floppy drive and edit your AUTOEXEC.BAT file.)

COMPATIBLE?

Microsoft has made a big point about how Windows 3.1 is compatible with all Windows 3.0 programs. Now that 3.1 is out, it is backtracking on its commitment to total compatibility with Windows 3.0 programs.

After you install Windows 3.1, you can read a file called APPS.HLP about the Windows 3.0 programs that don't work well or don't work at all with Windows 3.1. The list is not short, and it includes many major Windows programs like Adobe Illustrator and WordPerfect for Windows.

Some of the programs in the list have minor problems with choosing printers or slight differences in the way the screen will look between v3.0 and 3.1. Unfortunately, many programs just don't work at all. For example, the current version of Adobe Illustrator will not work with Windows 3.1, and a new version is not ready as this is being written. Adobe says that the new version may be ready within a month and the expected price for upgrading is $100. WordPerfect says that a version of WordPerfect for Windows that works with Windows 3.1 should be available within two months and cost $20 to upgrade. If you bought Microsoft's Productivity Pack, it will cost you $20 to upgrade to one that works with Windows 3.1.

You have to worry about more than application software with Windows 3.1. The file called README.WRI lists many other problems with Windows 3.1, many of which didn't exist with Windows 3.0. This 28-page document lists such problems as:

•Windows 3.1 doesn't work with DR DOS from Novell. Microsoft went out of its way to prevent Novell/Digital Research from making Windows work with DR DOS, which competes with Microsoft's MS-DOS operating system. Of course, Windows 3.0 worked just fine with DR DOS, so one can assume that Microsoft was simply being nasty by preventing Windows 3.1 from working with it.

•WordPerfect 5.1, the most popular word processing program for the PC, may not work correctly when launched from Windows. Specifically, the Windows mouse and the WordPerfect mouse may not appear in the same place. The README.WRI file gives a nine-step procedure for correcting this.

•Many CD-ROM drives don't work properly with Windows 3.1 unless you update the drivers. Microsoft tells you to contact the manufacturer (instead of supplying the corrected drivers in the first place).

SO, SHOULD YOU UPGRADE?

It really depends on how important the new features are and whether or not you're using programs or hardware that Windows 3.1 isn't compatible with. You'd certainly be smart to check with the manufacturers of any Windows software you're using before upgrading to see whether your current versions are compatible, and what it will cost to upgrade if they aren't.

Most people who use Windows 3.0 every day will upgrade within the next few months. Many people who bought Windows 3.0 (or got it free with their computers) rarely use it and can safely stay with Windows 3.0 and not worry about the upgrade hassles. If you want to use any of the features that only exist in Windows 3.1 like TrueType fonts or object linking and embedding, you have to upgrade, and you should use caution as you do. ■

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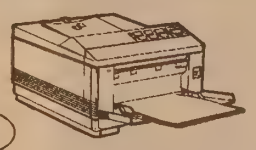

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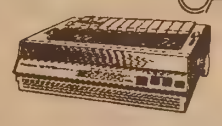

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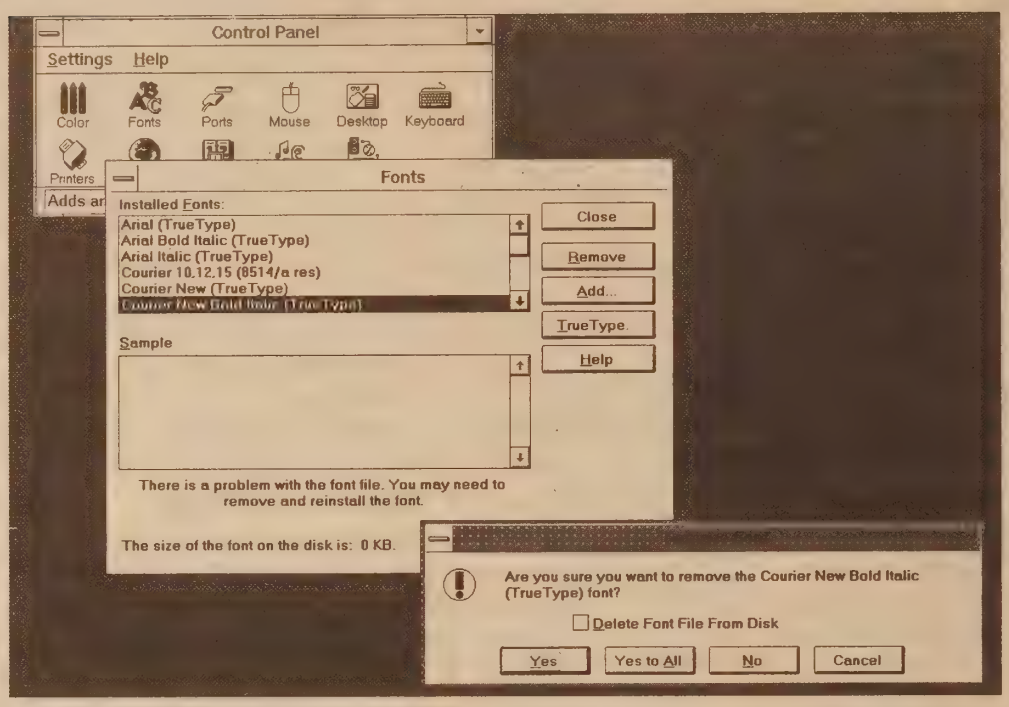
Windows 3.1

Upgrading Without Tears

BY LENNY BAILES



Elsewhere in this issue, you may have noticed that the reviews for Windows 3.1 blow hot and cold. So 3.1 prints faster and has a better file manager—it's also incompatible with some 3.0 apps and may blow the installation procedure. All of this is true.

You won't necessarily have difficulty installing Windows 3.1. There are a lot of systems out there where you can just pop the disks into the drive one after another—and bingo, it's done! This is particularly true when you install Windows 3.1 into a new directory in a single-user environment.

However, a significant number of people have reported anomalies in performing 3.1 upgrades: It won't come up in Enhanced mode, programs don't find the new TrueType fonts, or old programs don't work any more. Microsoft has invested a lot of effort in trying to minimize problems, but Windows is a giant beached whale of a program. It juggles system resources in a smoke-and-mirrors contest with the DOS operating system. The following notes may help you to steer clear of installation problems.

A SHORT COURSE IN SETUP

Let's say that you've weighed the options and decided to spring for the upgrade. You're now in front of your computer with the disks in hand.

You might simply try your luck by inserting the first Windows disk and typing SETUP. Alternatively, you might take a quick look at the booklet called "Getting Started with Microsoft Windows" to see what lies ahead. You'll find out about basic hardware requirements, and about SETUP's philosophy of driver replacements, but some things the booklet won't tell you. For example...

•SETUP checks for a compatible memory manager before starting the installation. If it doesn't like yours, it may complain. If your system is running DR DOS 6, you will have to upgrade to the business release dated 4/9/92, or the installation will abort. All registered DR DOS 6 users are scheduled to receive this upgrade in the mail. You can also download it from the Digital Research support forum on COMPUServe.

•If no memory manager is installed, then SETUP will automatically load the new version of HIMEM.SYS bundled with Windows 3.1. If your Windows 3.0 configuration is stable with QEMM 5.11 to 6, 386MAX 5.1 to 6, or DOS 5's memory management, the memory manager will probably not cause problems in a 3.1 upgrade. (Windows installs itself in Standard mode. After installation, you may need to tweak the memory manager to get Windows to come up in 386 Enhanced mode. See the troubleshooting tips at the end of this piece.)

•SETUP will also complain if it finds a third-party disk cache installed in your CONFIG.SYS. If you haven't had problems running Windows 3.0 with your cache, the chances are that you won't have problems with 3.1, but to be on the safe side, you can heed these Microsoft warnings and remove offending programs from your CONFIG.SYS and AUTOEXEC.BAT before continuing the installation. Alternatively, you may allow the installation to continue. The worst thing that can happen is it may abort in midstream, ruining your previous version of Windows.

Problems with SuperVGA video drivers are the most common. Never trust SETUP to preserve a high-resolution setting from a previous version of Windows. At the very least, choose "Custom Installation," and direct SETUP to use your OEM driver pack by selecting "Other" from the video choices.

To eliminate this danger, back up your previous version of Windows before installing 3.1. As a minimal precaution, create a new subdirectory and back up all of your 3.0 INI files, (WIN.INI, SYSTEM.INI, PROGMAN.INI, CONTROL.INI, and any others in the \WINDOWS directory). Also back up all of your program group files (Example: Copy [d:]\WINDOWS*.GRP [d:]\WINBACK). If these files are preserved, you may always recopy them into the \WINDOWS directory and preserve your customized settings.

Before running SETUP, you may also decrease the odds of bizarre

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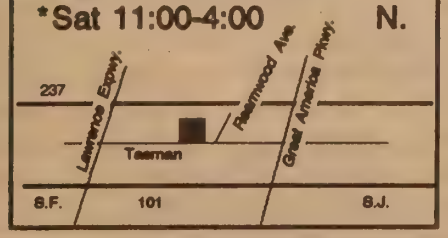

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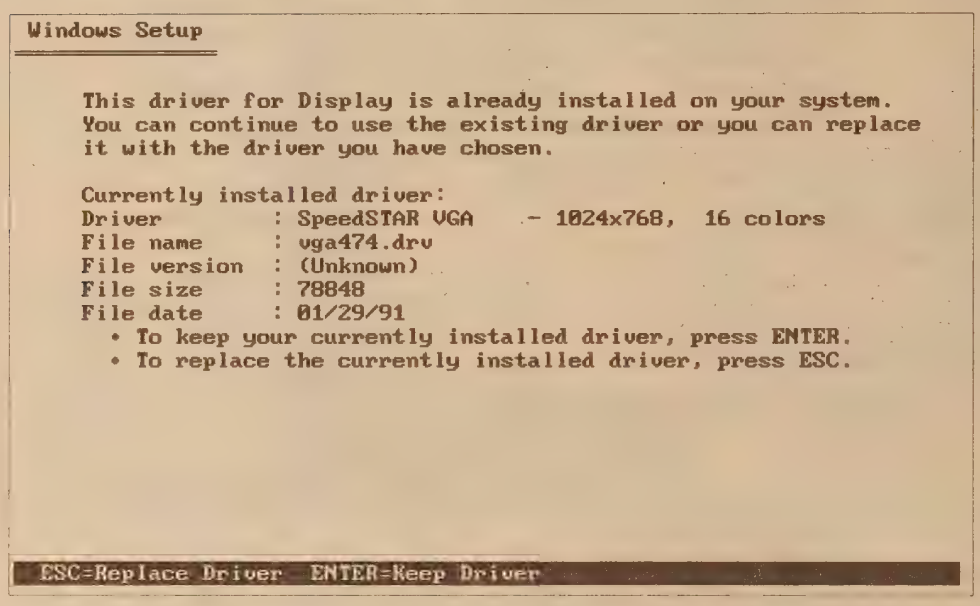
error messages by removing virus detection software or erase protection utilities, and by logging off of any network drives. (On many systems, this step may be unnecessary. Windows 3.1 is designed to recognize IPX and NETBIOS-based networks, and automatically accommodate them.)

As SETUP continues, you can choose between an "Express" or a "Custom" installation. "Express" more or less steamrollers its way through the installation. "Custom" presents a series of prompts to adjust the configuration or omit parts of Windows from the installation. If you're low on disk space, for instance, you may elect not to install help files, or bitmapped wallpaper. If you have applications that require special third-party drivers, "Custom" installation allows you to tell Windows about this.


Windows Setup
This driver for Display is already installed on your system.
You can continue to use the existing driver or you can replace
it with the driver you have chosen.
Currently installed driver:
Driver : SpeedSTAR VGA - 1024x768, 16 colors
File name : vga474.drv
File version : (Unknown)
File size : 78848
File date : 01/29/91
• To keep your currently installed driver, press ENTER.
• To replace the currently installed driver, press ESC.
ESC=Replace Driver ENTER=Keep Driver

SETUP finds the first previous version of Windows present in your PATH statement. You can overwrite this version or install 3.1 in a separate directory. Theoretically, if you overwrite, even with the "Express" setup, all of your previous custom settings will be preserved. This is most likely.

DRIVERS

In fact, if anything, the installation program errs on the conservative side. Third-party drivers for Windows applications are left unchanged, and some may cause compatibility problems with 3.1. If you have third-party video drivers, communications drivers, and system files for Windows 3.0, the wisest course is to select "Custom" setup and tell Windows about them. After the installation is done, you should inspect both the \WINDOWS and \WINDOWS\SYSTEM directories. Make note of any files with a .DRV, .FON, or .DLL extension that don't bear the 3.1 release date of 3/10/92. If you have problems with 3.1 after installation, these drivers are the first thing to suspect.

Problems with SuperVGA video drivers are the most common. Never trust SETUP to preserve a high-resolution setting from a previous version of Windows. At the very least, choose "Custom Installation," and direct SETUP to use your OEM driver pack by selecting "Other" from the video choices. An even safer way to avoid hassles is to install Windows 3.1 for standard VGA, rather than choosing the high-res driver. After installation is completed, you may run SETUP again to update the display. This generally forces Windows to copy the correct drivers into the \WINDOWS\SYSTEM directory. Choose "Other" from the configuration choices, and use your OEM diskette, as if you were installing the third-party drivers for the first time.

Note: if Windows 3.1 drivers aren't yet available for your VGA card, you may be able to use your 3.0 driver OEM diskette. To do this, you may have to make a small change. If your OEM diskette contains a file called SETUP.INF, you need to rename it to OEMSETUP.INF. Don't follow any "3.0-oriented" directions to overwrite the SETUP.INF file in the \WINDOWS\SYSTEM directory.

PRINTER PROBLEMS

The most common printer-related problem in a 3.1 installation is that your programs don't recognize the new TrueType fonts. If this happens to you:

•Reselect your printer from within the application (choose "Printer Setup" from the File menu).

• If that doesn't work, open the Fonts icon from Windows' Control Panel. When you point at a TrueType font, you should see a print sample in the box below. If no sample appears, try removing the font and reinstalling it. (See enclosed screen shot.)

• If you still don't get TrueType fonts on your application menus, reinstall your printer: Open the Printers icon from Control Panel and click on "Add." If Windows asks you whether to replace a driver currently on disk, say yes. Make the newly installed printer your default printer, and see if the TrueType fonts now appear in your applications.

MEMORY MANAGEMENT

One common memory management problem with Windows 3.1 is failure to start in 386 Enhanced mode because of a conflict with the memory manager for unused video address space.

If you are using a VGA adapter on your system, try adding the following parameter to your memory manager in the CONFIG.SYS: X=B000-B7FF. Example: Device=[d:]\QEMM386.SYS X=B000-B7FF RAM. This may cure the problem.

Alternatively, you may exclude this address by placing a statement in the [386enh] section of SYSTEM.INI: EMMEXCLUDE=B000-B7FF. For good measure, you may also want to exclude the VGA ROM video address space (X= or EMMEXCLUDE=C000-C7FF).

HELP FILE

Microsoft includes a help file that provides information about 3.0 application incompatibilities under Windows 3.1. To read this file, select "Open" from the File menu inside of Windows Help and load the file called APPS.HLP. If you own Word for Windows 1.1, WordPerfect 5.1/WordPerfect for Windows, Adobe TypeAlign 2.0, etc., don't panic. Some of the incompatibilities listed for these programs are minor. I've found, personally, that some of the applications listed in this help file work fine under Windows 3.1. Other applications (such as Adobe Illustrator 1.1) are completely incompatible and must be upgraded.

If you enjoy using Word for Windows, PageMaker, CorelDRAW, Excel, and some of the other standout products for this environment, the upgrade will eventually make life easier. But you may have to look behind the wizard's curtain once in a while to keep him on duty pulling strings.

IS IT FOR YOU?

Is it worth it to go through all of this trouble to get Windows to run? See the other reviews in this issue for details on pros and cons.

My advice is to think about how much you like working with Windows applications. If you enjoy using Word for Windows, PageMaker, CorelDRAW, Excel, and some of the other standout products for this environment, the upgrade will eventually make life easier. But you may have to look behind the wizard's curtain once in a while to keep him on duty pulling strings. ■

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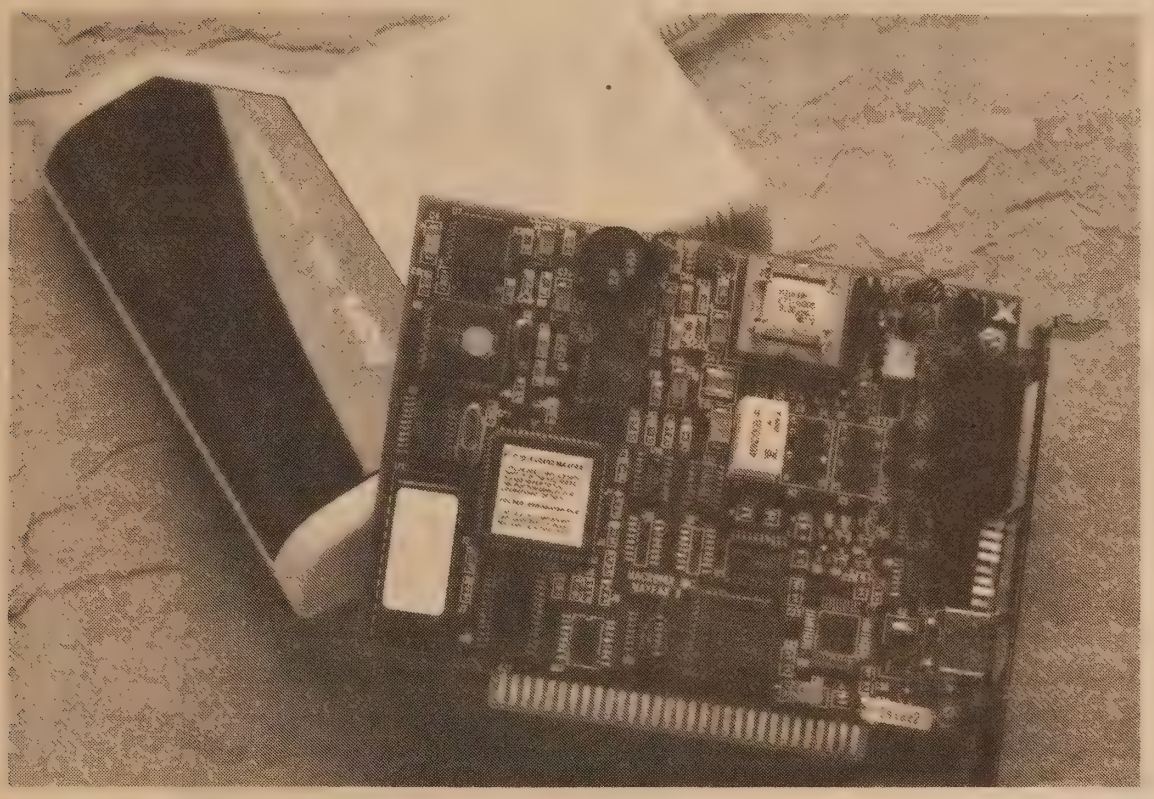

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Creating A Playstation

BY MIKE MARKOWITZ

Any computer vendor can sell you a fully configured workstation, but you have to create your own playstation. "Playstation" is the term I just coined to describe a desktop computer optimized for entertainment.

Computer-based entertainment is one of the noblest applications of technology, but the industry often seems to treat it as a dirty secret. This stems, in part, from the social myth (often mislabeled the Protestant Ethic) that work is good and play is bad.

Early personal computers were often derided as mere toys by mainframe jockeys, so anything associated with entertainment makes some personal computer vendors uneasy.

Why would anyone want to build a playstation when you can get a ready-made game machine for a lot less money?

"Game Machine" describes systems that are microprocessor controlled, but lacking critical attributes of a general-purpose computer (keyboards, disk drives, or serial ports). Some, like the Nintendo or Sega Genesis, are basically peripherals for a television set; others, like the Gameboy or Atari Lynx, are self-contained portables. Game machines incorporate some technology computer users might envy, such as fast 16-bit video, hardware optimized for animation, and low-cost glove-type input devices. But the cartridge-based format limits game machines to a narrow range of mass-market titles—mostly arcade shoot-'em-up action games, with an occasional crossover hit like the strategy puzzle game Tetris.

With a playstation, you have access to much richer entertainment resources. Hundreds of new commercial computer games are published each year. There are no public-domain or shareware Nintendo games, because there is no way a hobbyist could create or distribute such a thing. But you can download literally thousands of public domain or shareware computer games from a good bulletin board, and as programming tools and knowledge become more widely distributed in the culture, the quality of such games is getting better all the time.

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You can send email to Mike Markowitz on America Online (MOUSKOWITZ) or the Internet (mmarkowi-@pepvax.pepperdine.edu). Or fax (310)983-1474.

A good set of earphones is desirable, if high-fidelity digitized explosions or demonic shrieks might disturb occupants in the adjacent room, apartment, or neigborhood.

WHY GAMES ARE IMPORTANT

During the '70s and '80s, computer games helped to spark the interest of an entire generation of users. In the previous generation, electronics was something that only interested ham radio nerds and hi-fi audio hobbyists. Programming was something engineers did in FORTRAN, or payroll and inventory geeks did in COBOL.

The desire to make a spaceship swoop across the screen, fire photon torpedoes, and blow up aliens inspired thousands of kids to attempt difficult feats, like learning 6502 assembly language. Game programming is an important seedbed for tomorrow's commercial, scientific, and industrial software talent. That makes it a critical national human resource, since software is one of the few things America produces that the rest of the world still wants to buy, or at least steal.

Game programmers have to wring maximum performance out of existing hardware, and the tricks they discover help to advance technology. Computer game programmers have always pushed the state of the art in graphics, animation, and sound. The creation of simulated opponents for computer strategy games (especially chess) has been an important driving force in the development of artificial intelligence, while interactive text-based adventure games have contributed to the development of computer techniques for parsing and interpreting natural language input.

KINDS OF ENTERTAINMENT

Some users enjoy a wide range of games, some are only interested in a specialized category. Arcade action games (shoot-'em, stab-'em, slug-'em or zap-'em) are perhaps the most popular. Some people play games for the adrenalin rush.

Abstract strategy or puzzle games, on the other hand, can be very relaxing. I've seen people play the solitaire game included in Microsoft Windows for hours, achieving a state of total mindlessness. As one of my teachers used to say, Emptiness is not the worst condition of the mind.

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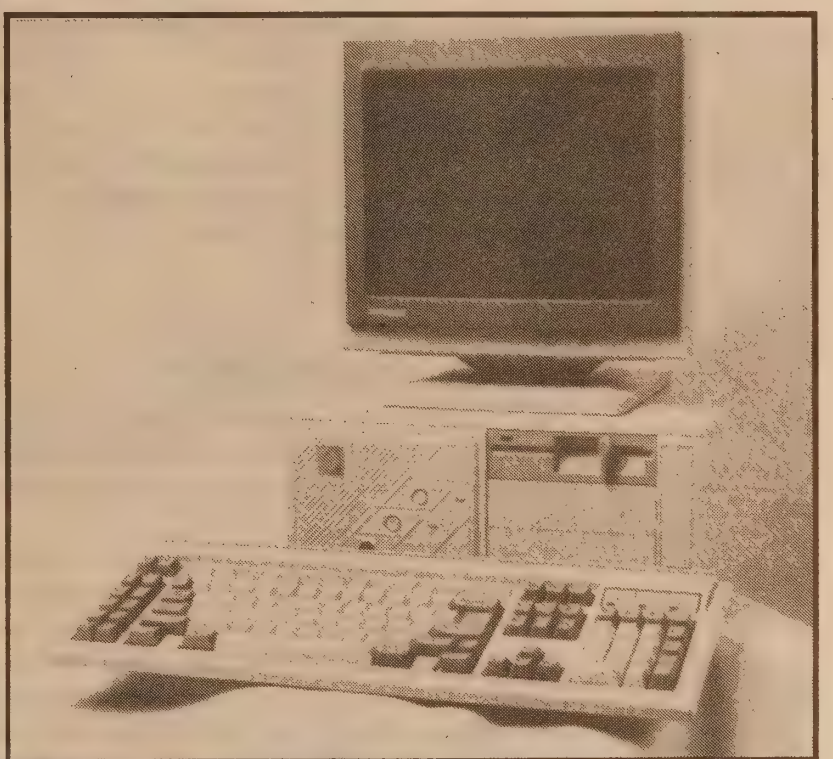

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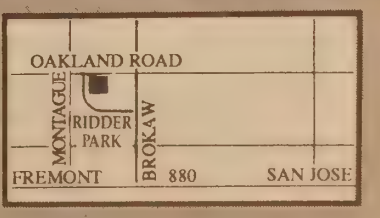

Interactive adventure games originally developed around the dungeons and dragons/swords and sorcery theme, but can also be found in science fiction, detective, secret agent, and other settings. The common feature is that these games usually involve intricate puzzle solving, and take a long, long time to complete.

Computer implementations of classic board games, card games, and casino gambling have always been popular. Flight simulators are available for every sort of aircraft, although some pilots complain that the lack of rudder pedals, stick "feel," and g-forces makes the "simulation" illusory. Sports simulations are a constant source of new titles—football and baseball being the most popular. Low-energy sports like golf are easier to simulate than high-energy sports like basketball.

"Software toys" are not exactly games, but complex environments you can shape and play around in. SimCity, published by Maxis, created this category, followed by SimEarth and SimAnt.

The quality of a computer game depends on how well the designer and programmers have integrated graphics and animation, sound, and user interface elements into a total experience that is easy for the user to get into, deeply engaging for the imagination, and diverse enough to retain its interest over many playings.

When you are shelling out $30 to $60 for the product, you should expect and demand no less.

CHOOSING A PLAYSTATION

Unfortunately, market forces have narrowed the choice of a playstation for users who would like to stay on the leading edge of computer entertainment. You can buy anything you want, as long as it's an MS-DOS system.

According to the Software Publishers Association (SPA) MS-DOS versions represent about 85% of the market for entertainment software. The remaining 15% of the market is divided among Commodore, Apple, and a dwindling number of Atari diehards.

Technically, the Commodore Amiga has many superior features, particularly in the area of graphics and sound. A lot of stuff is built into the Amiga that costs extra (or is just not available) on comparably priced MS-DOS computers. But the size of the Amiga market severely limits the variety of new software titles. Like the Mac, the Amiga is a difficult system for a programmer to master, and many of the games are true labors of love, created by dedicated hobbyists for dedicated hobbyists.

Macintosh might be another option. The Mac IIsi is a good choice, and the IIci is better, but the great barrier is still cost. The low-cost color Macs (LC or LC II) are not very good game systems unless you buy the rather pricey high-res 13" monitor, and add plenty of extra memory and a big hard drive. Some advantages of the Mac for entertainment include built-in sound output, and (if you have enough video RAM) excellent 256-color graphics. Disadvantages include the lack of a standard joystick port—most Mac joysticks have to share the desktop bus with the keyboard and mouse.

Some game publishers have abandoned the Macintosh, just as they abandoned the Apple II a few years ago. The strongest remaining market for Macintosh entertainment software is probably programs with educational content, since Apple's dominant position in schools had not yet been completely eroded by low-priced MS-DOS systems.

WHAT YOU NEED

A state-of-the-art playstation should be built around an 80386 or 80486 microprocessor running at 20MHz or faster. Since an increasing number of MS-DOS entertainment titles use the Microsoft Windows environment, your playstation should be optimized for Windows—that means a mouse, at least 4MB of RAM (6 or 8 is even better), an 80 or 100MB hard drive, and (very important) a fast 16-bit Super VGA video card with 1MB of video RAM. A color monitor that looks sharp with Windows should look sharp with almost any kind of game.

At present, I haven't seen any MS-DOS games that take up more than 8MB of hard disk space or require more than 2MB of available RAM, but designers and programmers in this competitive market are locked into an inexorable upward spiral, so you have to assume that the hottest new games are going to get bigger and more memory-hungry. Memory and hard disk space are cheap right now, and no user has ever regretted buying too much memory.

The enjoyment of many games is enhanced by a joystick. Some computers have a built-in game port for a joystick; most require an inexpensive card (about $30 or less) to provide a joystick port. The big CH Flightstick is the best joystick I have used, but smaller models made by Kraft are quite acceptable.

An ideal playstation should have stereo sound output. Audio cards made by Ad Lib and Roland are well supported by current software, but a growing number of PCs have built-in audio, a capability that was pioneered by Tandy. A good set of earphones is desirable, if high-fidelity digitized explosions or demonic shrieks might disturb occupants in the adjacent room, apartment, or neigborhood.

The desire to make a spaceship swoop across the screen, fire photon torpedoes, and blow up aliens inspired thousands of kids to attempt difficult feats, like learning 6502 assembly language. Game programming is an important seedbed for tomorrow's commercial, scientific, and industrial software talent.

Something you probably don't need yet is a CD-ROM drive (about $500). This technology promised almost unlimited storage of high-quality sound and graphics on inexpensive compact disks. There have been a few entertainment-oriented titles, but so far, CD-ROM has failed to catch on as a distribution medium, probably for the same reason the video laser disc never realized its potential—because buyers are waiting for erasable, rewritable optical disks.

A final component to consider is a modem. If you have gaming friends with similar interests, there are many titles that support remote two-player competition over a telephone link-up. Spectrum Holobyte has implemented this feature particularly well in their recent games. Many local bulletin boards provide interactive multiplayer games, and even the most solitary gamer can use a modem to download public domain and shareware or demo versions of commercial games from a BBS or online service.

At current retail prices, it should be easy to put together a playstation for under $2500. Hey—if you add a printer and some software it even converts into a workstation. ■

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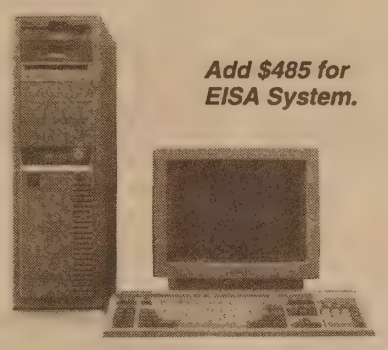

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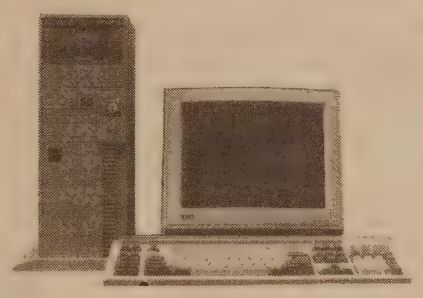

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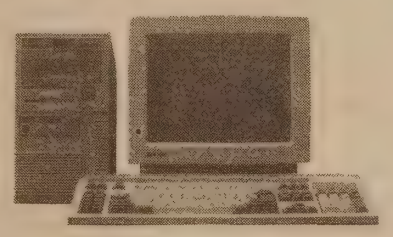

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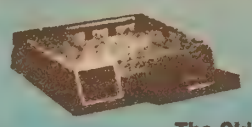

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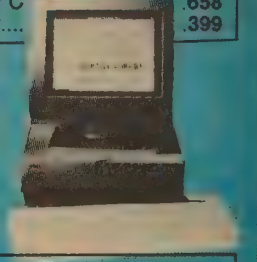

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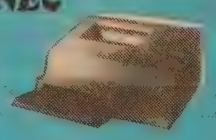

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- IBM VGA Compatible Display System

EVEREX COMPUTER SYSTEMS DIVISION

COMPAQ LTE 386 Lite 20/25

- 20/25MHz 386SL Microprocessor
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Tempo Carrier

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- 1.44MB 3.5" Floppy Drive
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- Wide variety of built-in fonts
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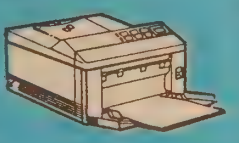

LaserJet IIP Plus Printer

- Lowest price of any HP LaserJet printer for the most affordable solution
- 300 dpi text and graphics provide publication quality printing
- Small footprint makes this the ideal desktop HP LaserJet printer
- Support by virtually all popular PC software packages ensures maximum use
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LaserJet IIIsi Printer

- Fast 17-ppm printing
- 300DPI resolution
- HP PCL5 language
- Networkable

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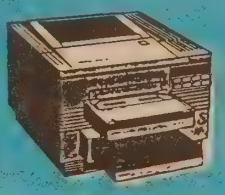

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- Wide variety of easy-to-use, scalable, built-in typefaces
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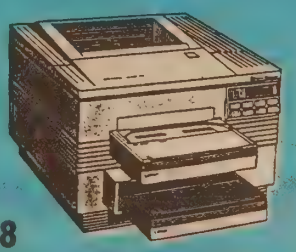
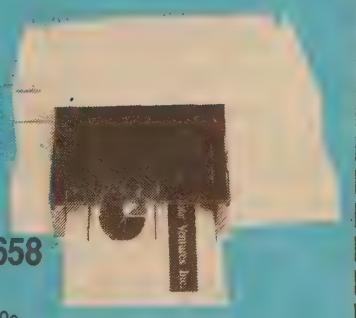


HP DeskJet 500c

- Plain paper inkjet printing
- Black print speed up to 3 pages per minute
- MS Window color print speed 4 minutes per page
- 300 dpi resolution

$658



HP DeskWriter C

- Identical to the DeskJet 500c but for your Macintosh
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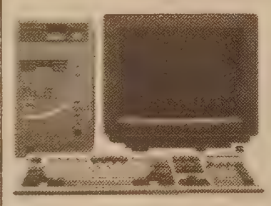

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- 80486-50MHz CPU, 0 wait state
- 1MB RAM on-board exp to 32MB
- AMI BIOS • 8 16-bit expansion slots
- Tower case w/220watt power supply

486-33MHz

64K Cache w/1MB RAM

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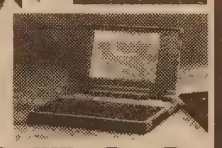

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- Backlit keypad
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P301

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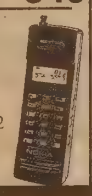

- 40 Number memory dial
- Electronic Lock
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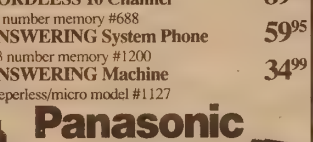

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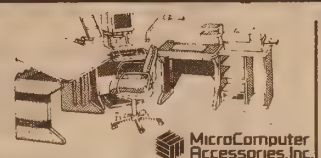

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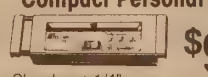

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Equipped with Answering Machine Interface!
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- 24 standard fonts, 35 type faces
- PCL 4 • 1 year limited warranty

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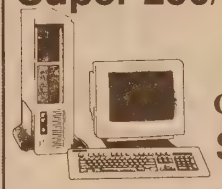

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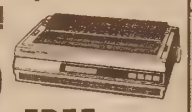

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- 6 built-in fonts
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- Color option available
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KX-P4410

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5ppm!

- 512K RAM exp to 4.5MB
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ESC/P2

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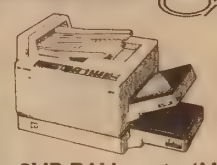

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- 2MB RAM exp to 4MB
- 500 sheet paper capacity
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- 24-pin, 315cps
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- 2 year warranty

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ESC/P2

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- **WIDE Carriage**
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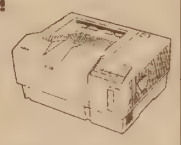
EPL-8000

13 Scalable fonts! Printer Sharing!



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IIP*Plus* 4ppm, PCL-4	777
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IIID 8ppm, dual tray, PCL-5	2295
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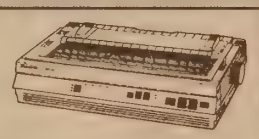

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- 1024x768 resolution

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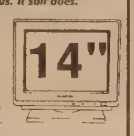

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- SVGA Monitor
- .28mm dot pitch
- 1024x768

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$889 9070U

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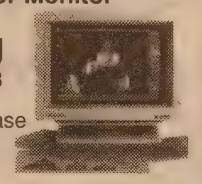

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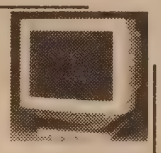

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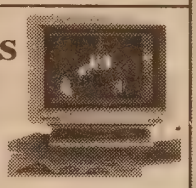

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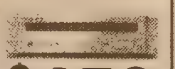

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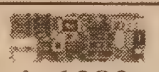

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The Complete Communicator does exactly what its name implies. On a single card you get a 2400 baud modem, a 9600 baud fax board, a full- or half-page scanner port, and a complete voice mail system. Yes, a single card, a single memory address, a single interrupt. What more could any computerist ask for?

This new version, v2.62, comes with FAXit for Windows, a fax software package that works with The Complete Communicator background program, and BitCom modem software. Other additions to the fax capabilities include direct scan-and-send support for legal sized documents and high memory support that allows the background program to be loaded into high memory.

If you have a beeper, you can set The Complete Communicator to beep you when you receive a new message. It will call your beeper number, send the numbers for you to call back, and then hang up all by itself. Not bad. You also have the option of having a call transferred, rather than just notifying a beeper.

VOICE MAIL

The centerpiece of The Complete Communicator is the voice mail system. This system has three types of mailboxes: voice, fax, and modem. You can set any of these types of mailboxes as the default mailbox to which your phone will answer. The fax mailbox comes as the default. This avoids the awkwardness of having everyone call you before sending a fax and having you then switch to the fax mailbox. But you must remember to create a voice message to tell callers that this is both a voice and a fax line and that they should press a key on their touch tone phone to leave a voice message.

To use voice mail, you must first load a background program so that The Complete Communicator can monitor the telephone line and answer the phone. I've tried the background program in low and high memory, as well as under DOS and under Windows, without any problems.

The Complete Communicator comes with a synthesized voice that presents options to the caller. After leaving a message, a caller can be presented with a variety of choices, selected through pressing different keys. These include listening to and/or rerecording a message, continue recording, erasing what was just recorded, or switching to another mailbox to hear or leave other messages.

You can create up to 999 mailboxes, each with its own password. This can make the phone system for your single-person company appear as complicated as your multiemployee competitors. More importantly, you can give each client a separate mailbox and password, allowing you to leave messages specifically for them. This can be especially convenient when you are on the road. The Complete Communicator system lets you listen to the messages left for you, and, if appropriate, leave a response in the appropriate mailbox.

This system also gives you the ability to send voice messages. You can set the time and phone number for sending messages, and request the listener to confirm the reception by pressing the appropriate key. Sending the same message to a group of people is also easy. Record your message, give The Complete Comunicator a group phone list, and away it goes. This is the same concept as the broadcast capability that comes with the fax software. Hopefully, the people you wanted are the same people that answered the phone.

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Continued on page 156

MAC-intosh

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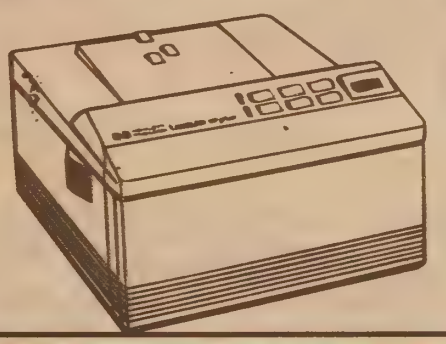

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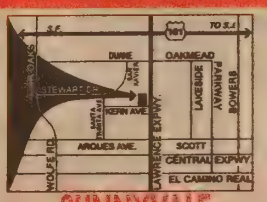

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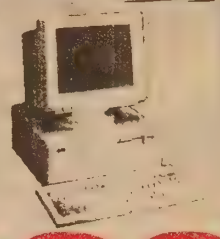

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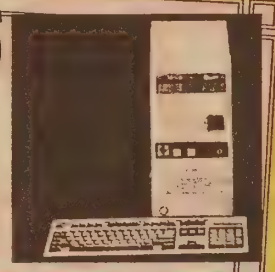

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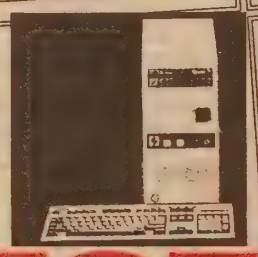

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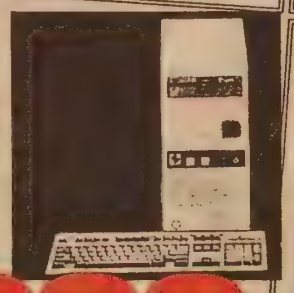

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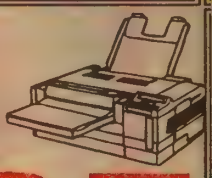

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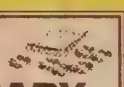

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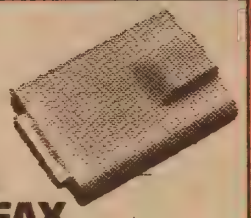

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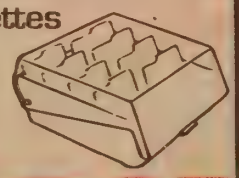

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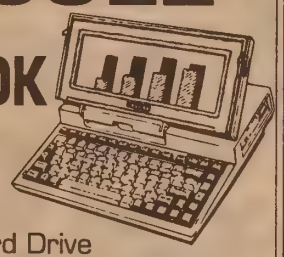

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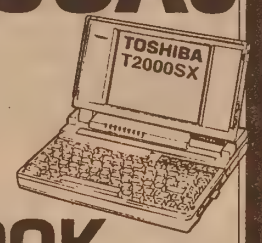

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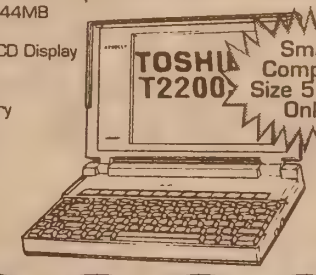

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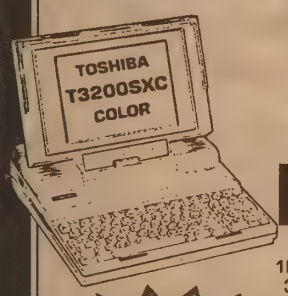

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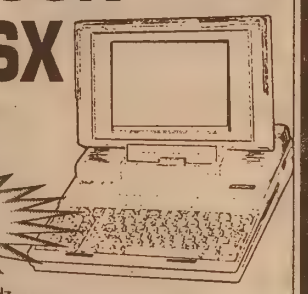

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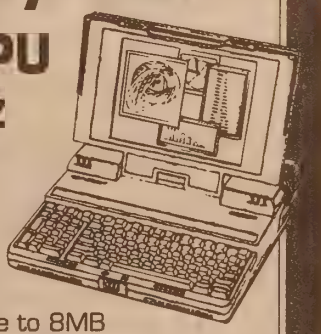

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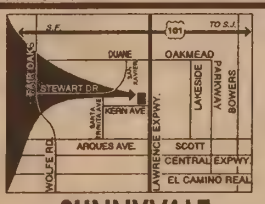

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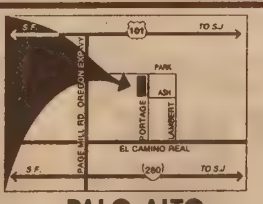

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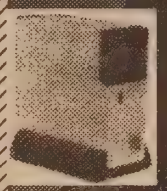

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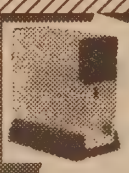

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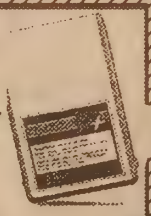

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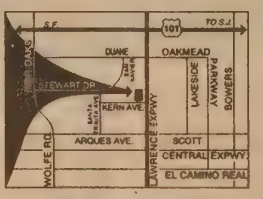

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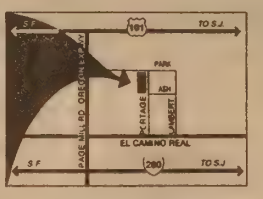

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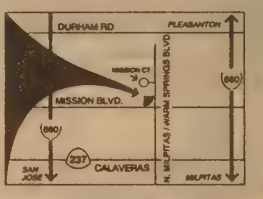

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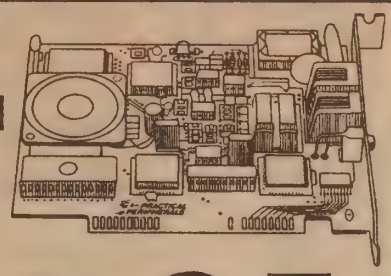

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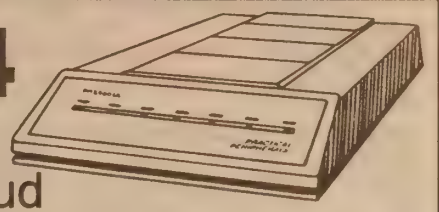

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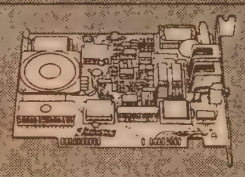

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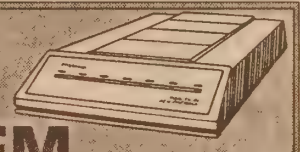

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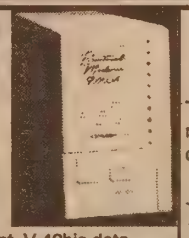

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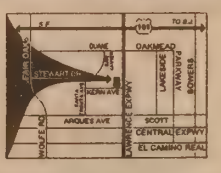

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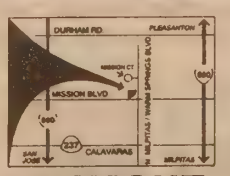

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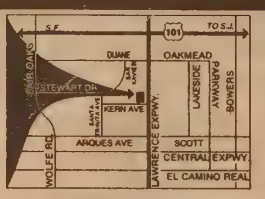

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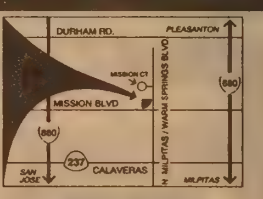

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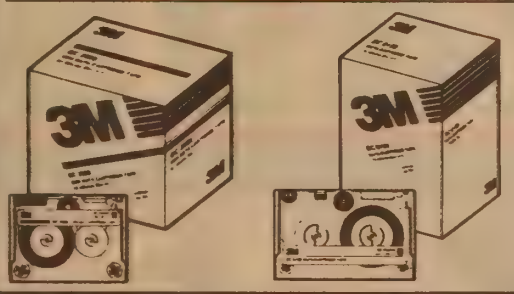

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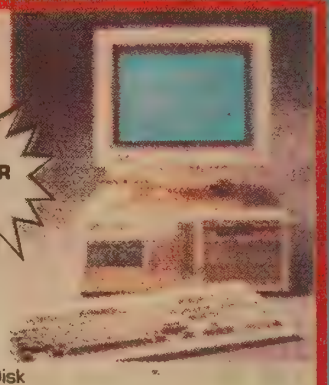

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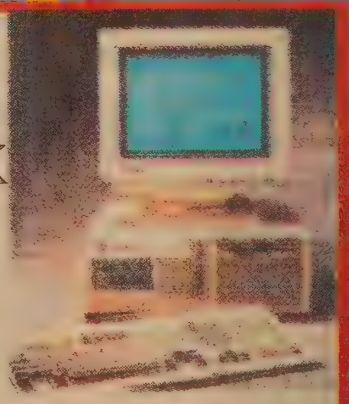

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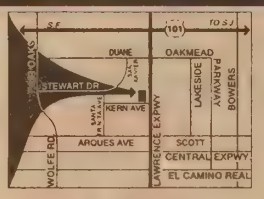

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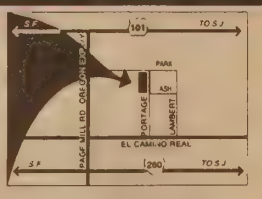

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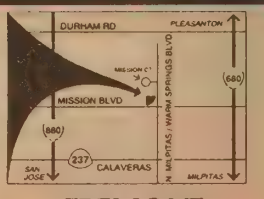

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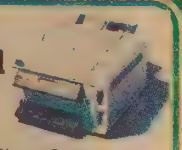

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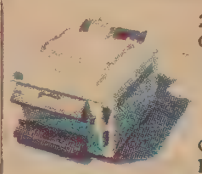

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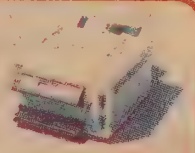

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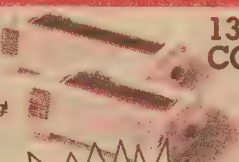

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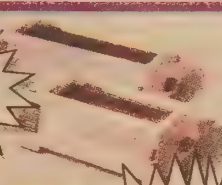

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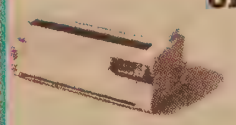

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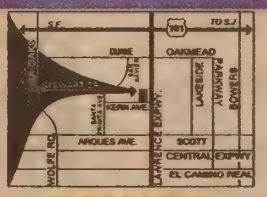

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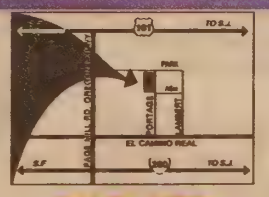

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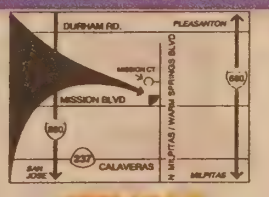

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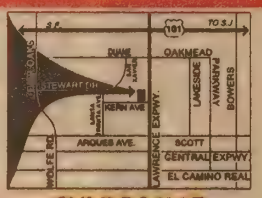

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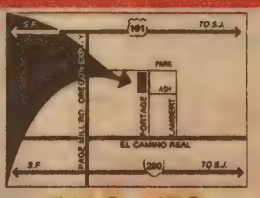

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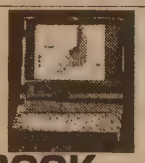

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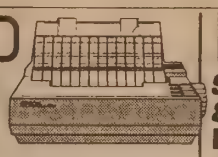

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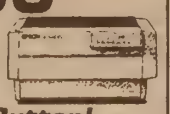

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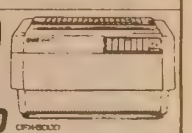

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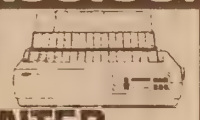

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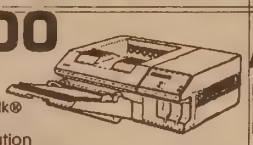

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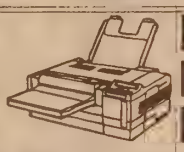

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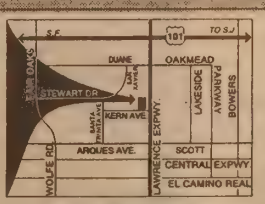

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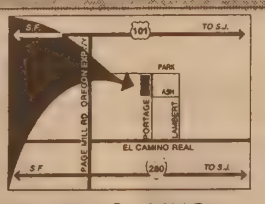

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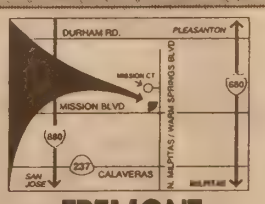

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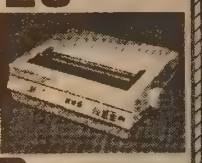

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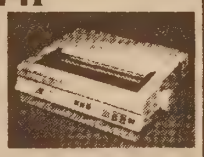

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100 CPS Letter Quality Mode
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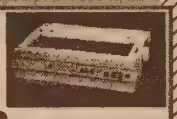

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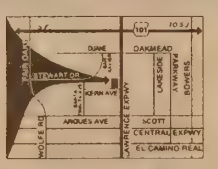

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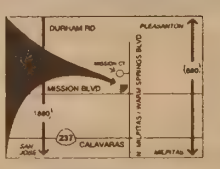

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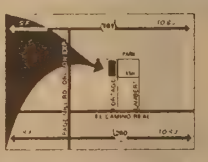

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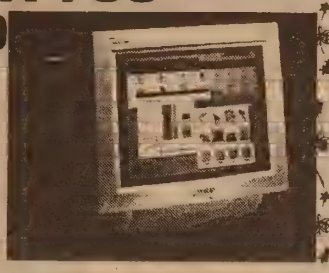

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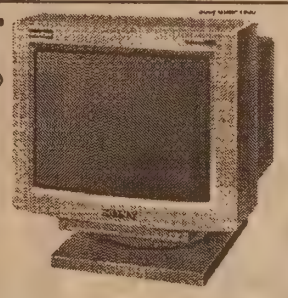

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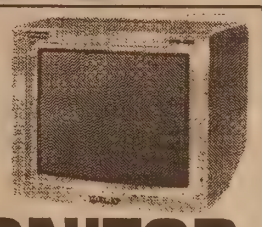

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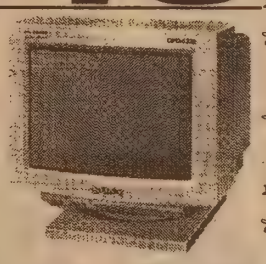

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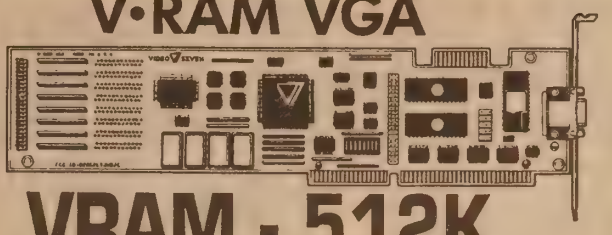

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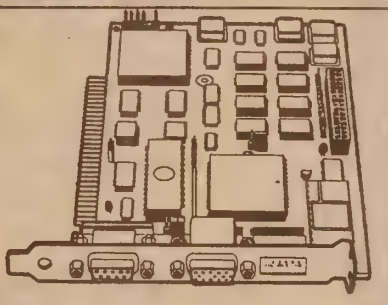

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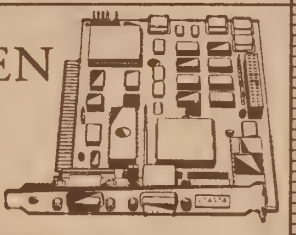

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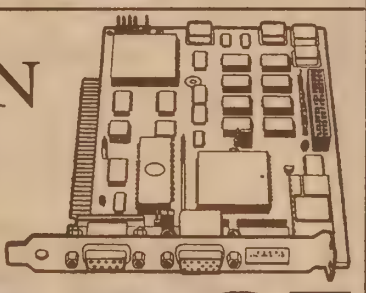

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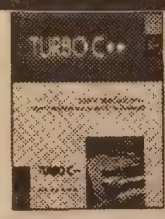

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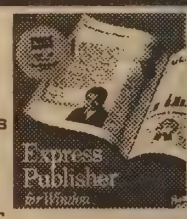

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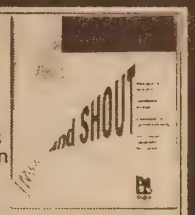

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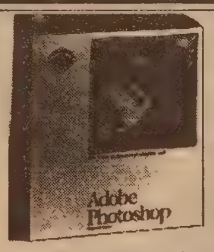

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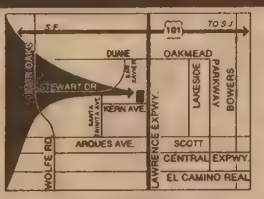

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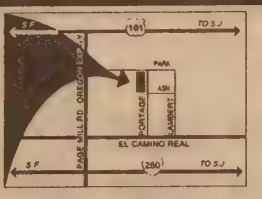

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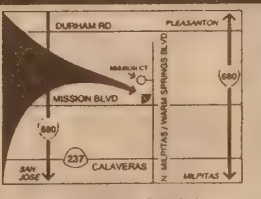

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PROTECT YOUR BIGGEST INVESTMENT!

"Because burglars don't go on vacation"

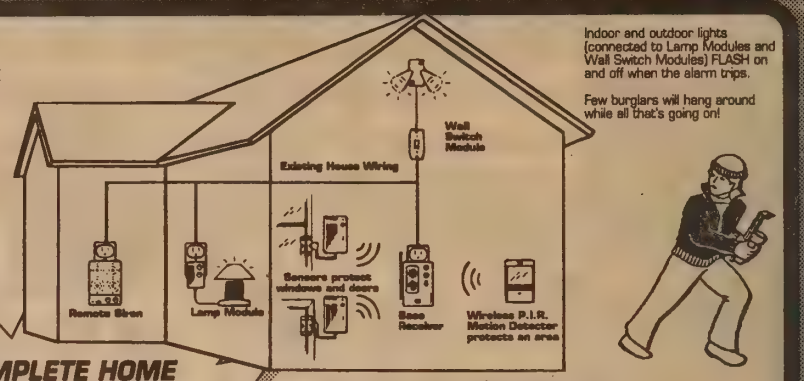
X-10 **PROTECTOR PLUS™**

WIRELESS SUPERVISED

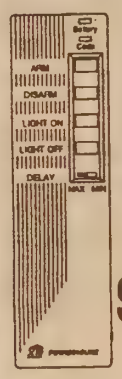
HOME SECURITY SYSTEM

HS9000 -9 PIECE SYSTEM
INSTALLS IN MINUTES- NO TOOLS -NO WIRING

Professional features and reliability
Supervised (self-checking) sensors
Protects up to 16 doors/windows (with extra sensors)
Loud alarm plus flashing lights • remote light control
Wireless passive infrared motion detector (optional)
Wireless 110 dB remote siren (optional)


Indoor and outdoor lights (connected to Lamp Modules and Wall Switch Modules) FLASH on and off when the alarm trips.
Few burglars will hang around while all that's going on!
Wall Switch Module
Existing House Wiring
Remote Siren
Lamp Module
Sensors protect windows and doors
Base Receiver
Wireless P.I.R. Motion Detector protects an area
Door/window sensors and remote controls send wireless signals to base receiver
The Remote Control arms and disarms the system and controls lights remotely

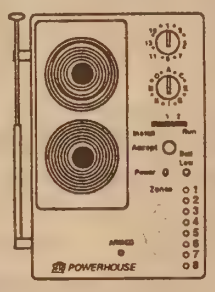
COMPLETE HOME SECURITY SYSTEM
Model HS9000 #1591501
$229.95



REMOTE CONTROL

The system is armed and disarmed by the press of a single button-simple! You can also control lights remotely.
Model HT544
Included in kit
#1481138

$19.99



BASE RECEIVER

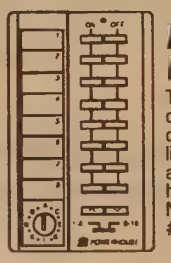
Base Receiver makes a loud noise when alarm is tripped and sends signals over existing house wiring to flash lights connected to X-10 modules.
Model BR521
Included in kit

Not sold seperately. Sold as part of the security system only.

MOTION DETECTOR

Supervised Wireless Motion Detectors send signals to trip the Base Receiver's alarm when someone walks within range.
Model SP544 Optional
#1515486

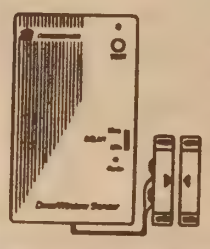
$59.95



REMOTE CONTROL

The RT504 Remote control lets you control up to 16 lights and appliances anywhere in your home
Model RT504
#118994

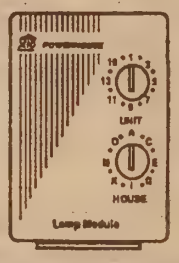
$15.95



DOOR/WINDOW SENSOR

Sensors send wireless signals to the Base Receiver when a door or window is opened. You can protect up to 16 door/windows by adding more sensors. Sensors are supervised for professional reliability- they report in to the Base Receiver every 90 minutes.
Model DW534
Included in kit
#1481149

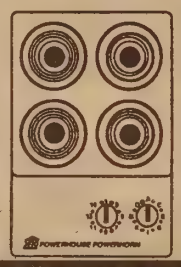
$14.99



LAMP MODULE

A lamp plugged into the Lamp Module will flash on and off when the alarm trips. You can also turn the lamp off and on by remote control.
Model LM465
Included in kit
#1481150

$12.95



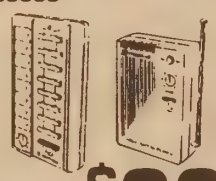
POWER HORN SIREN

Remote wireless 110 dB siren receives signals over house wiring and trips when Base Receiver's alarm is tripped.
Model PH508 Optional
#1515453

$49.95

The Protector Plus Supervised Security System can be expanded into a Home Automation System. The items shown below can be used either with the security system or alone to let you turn lights and appliances on and off by remote control. A complete range of controllers is available. The controllers send signals over existing house wiring to control lights and appliances connected to various types of modules. You can time your lights to turn on and off to give your home a lived-in appearance or even turn them on and off from any touch-tone phone. Everything just plugs in. It's just that simple!

WIRELESS REMOTE CONTROL
RC5000



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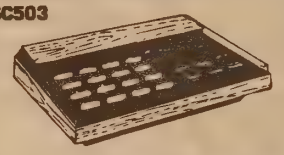
MINI TIMER-DAILY TIMER FOR FOUR MODULES
MT522

#1425581 **$29.95**

MAXI CONTROLLER - MANUALLY CONTROLS 16 MODULES
SC503



#1188832 **$19.95**

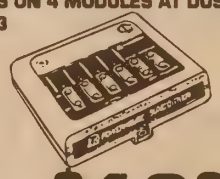
COMPUTER INTERFACE - 7 DAY TIMER (128 EVENTS)
CP290

#151860 **$49.95**

OUTDOOR FLOODLIGHT MOTION DETECTOR WITH LIGHT CONTROL
PR511

#1638523 **$49.95**

DUSK-TO-DAWN SUNDOWNER TURNS ON 4 MODULES AT DUSK
SD533

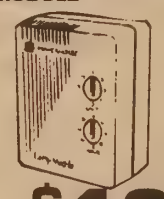


#1481172 **$19.95**

TELEPHONE RESPONDER CONTROL BY PHONE FOR 10 MODULES
TR551

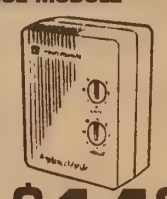
#122064 **$79.95**

LAMP MODULE
LM465



#1481150 **$12.95**

APPLIANCE MODULE
AM466



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WALL SWITCH MODULE
WS467

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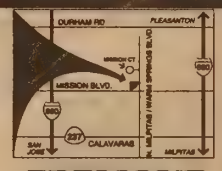

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- Lotus 1-2-3 for Windows
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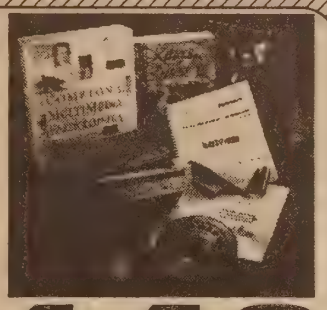

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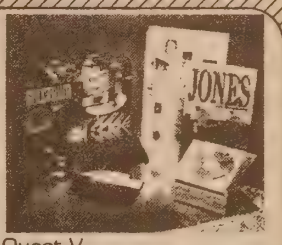
Includes Windows 3.1



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(44khz Sampling & Playback, 20 Voice, 4 Operator Synthesizer, Full 16-bit Bus Connector)
Sony CDU-535 Internal CD-ROM MPC
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PC Multimedia PC

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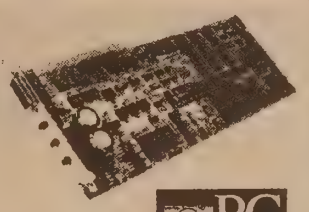
PRO AUDIO SPECTRUM 16



- 20 voice, four operator stereo synthesizer
- 8, 12, and 16-bit PCM
  2kHz-44kHz sampling and playback
- True SCSI interface
- Includes stereo studio f/x waveform sound editor
  TrackBlaster Pro-full mixing studio

PC Multimedia PC

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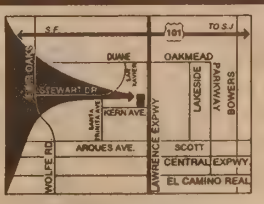

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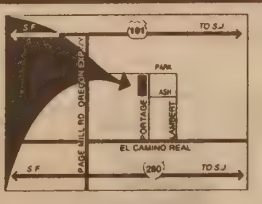

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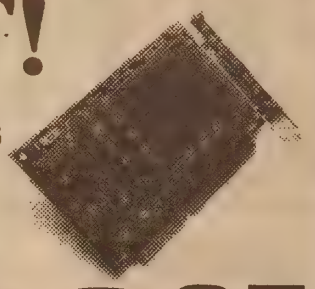
RAMpAT!



Extended memory for 80286, 80386 and 80486 systems. Adds up to 16MB of memory, using 1M x 9 and 4M x 9 SIMMs. Plugs into 16-bit industry standard expansion slot. Ideal for Windows, MS-DOS 5.0, OS/2 and Novell NetWare users.
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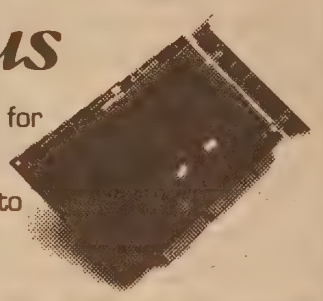

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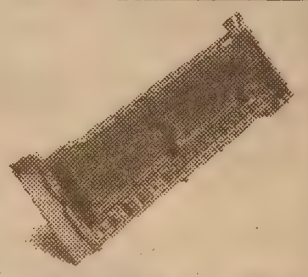
For the PS/2-32



32-bit memory expansion for PS/2 Models 70, 80 and 90. Works in all 32-bit Micro Channel compatible systems. Adds up to 32MB of memory using IBM compatible SIMMs. Supports both extended and expanded EMS memory modes. Includes EMS and extended memory managers, high memory manager and load high utility software.
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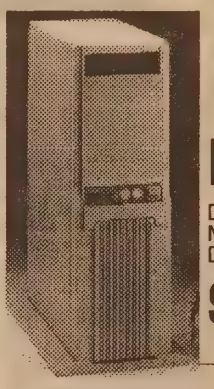

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DRIVE: 5.25" Floppy Disk Drive x6 #1618619

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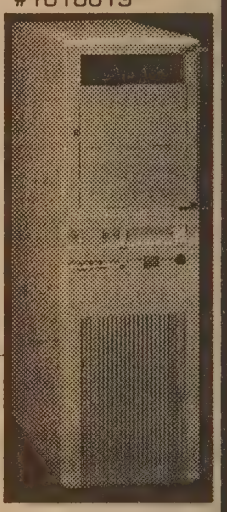
DVC-T01



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MEET MAINBOARD: 286, 386, 486,
DRIVE: 5.25" Floppy Disk Drive x6 #1688539

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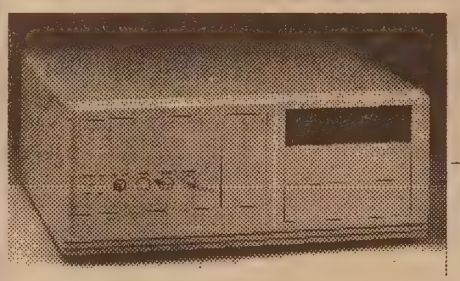

DVC-200

DIMENSION:424mm x 412mm x 171mm (LxHxW)
MEET MAINBOARD: BABY SIZE, 486, 386, 386SX, 286, XT
DRIVE: 5.25" Floppy Disk Drive x2, 5.25" Hard Disk Drive x1
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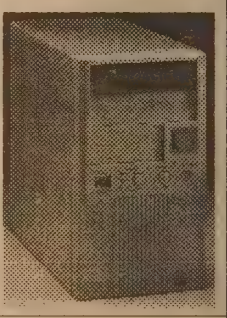
DVC-603



DIMENSION: 405mm x 330mm x 180mm (LxHxW)
MEET MAINBOARD: Baby Size, 286, 386,
DRIVE: 5.25" Floppy Disk Drive x2
3.5" Floppy Disk Drive x2
3.5" Hard Disk Drive x1
#1620175

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285 WATT POWER SUPPLY!

DVC-604

DIMENSION:
405mm x 330mm x 180mm (LxHxW)
MEET MAINBOARD: Baby Size, 286, 386,
DRIVE: 5.25" Floppy Disk Drive x2
3.5" Floppy Disk Drive x2
3.5" Hard Disk Drive x1 #1620175

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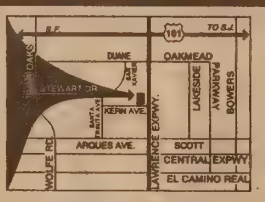

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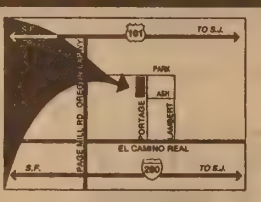

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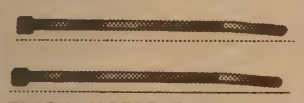

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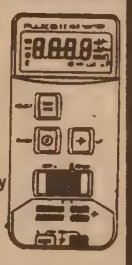

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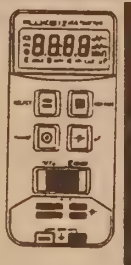

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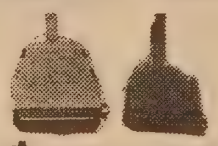

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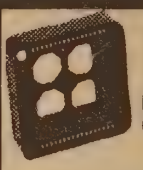

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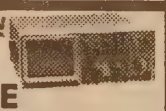

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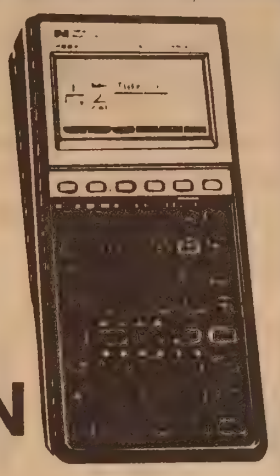

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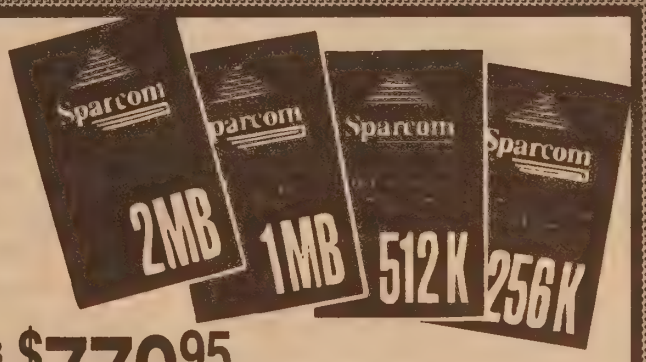

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Continued from page 130

When you are traveling, you can do everything from a remote phone just as easily as from your office. Once you dial in and are recognized as the boss, you have complete control. Now you can listen to your messages, archive the ones you need to save, or forward some to others.

If you have a beeper, you can even set The Complete Communicator to beep you when you receive a new message. It will call your beeper number, send the numbers for you to call back, and then hang up all by itself. You also have the option of having a call transferred, rather than just notifying a beeper.

Most of the functions offer a range of options, giving you flexibility to customize almost any element of the voice mail system. For example, you can set a maximum message length for messages from 30 to 999 seconds. However, even with all of the customization options, The Complete Communicator is easy to use and understand. I found that leaving everything on the defaults was a good way to begin using the program. After using The Complete Communicator for awhile, it's easy to reset the functions to whatever works best for you.

RESOURCES:

The Complete Communicator v2.62, $499
The Complete PC, Inc.
1983 Concourse Dr.
San Jose, CA 95131
(408)434-9600

OTHER TYPES OF COMMUNICATON

I spend almost 100% of my time under Windows, and use the included FAXit for Windows, or WinFax Pro, as my fax printer. However, WinFax Pro does not work with The Complete Communicator. Also, I use The Complete Communicator fax software to print or view my faxes.

The modem on The Complete Communicator works the same as its counterpart on The Complete Fax 9600, also from The Complete PC. I used this modem with the usual array of telecommunication software, again with no difficulties.

I tested the scanner port on The Complete Communicator with The Complete PC Page Scanner. Although I had no problems, you must be careful when setting the defaults in the scanner software. The I/O address and Interrupt level for both the scanner and Complete Communicator must match exactly. If not, strange things may happen. When I inadvertently set the Interrupt for the scanner differently than for The Complete Communicator, everything appeared to work, but the scanned image appeared on the screen while the paper moved through the scanner. I switched back to DOS, tried the scanner again, and everything worked. There is a section in the Appendix devoted to problems, and it told me that I probably had set the interrupts differently, which was true. I reset the Interrupt level so they matched, and everything worked.

The Complete Communicator runs from a traditional menu-type of screen, with all menu items also controlled by function keys. The F1 key calls up a good, context sensitive help that explains each of the options available from the screen you are currently looking at. In fact, after setting the initial options, the online help is so good you will probably not need to check the printed documentation again.

For those who do read the documentation, it is complete, as well as easy to read and understand. I found answers to almost all of my questions in the documentation. And, for me, that's probably a first.

I find that the multitude of functions on a single board allow me to run my consulting business with a minimum of hassles. I haven't found any other fax board or voice mail system as easy to use as The Complete Communicator. And, since everything fits on a single board, I would not switch to multiple boards to accomplish these same things, ever. I guess you can say, like the old ad, I'd rather fight than switch. ■

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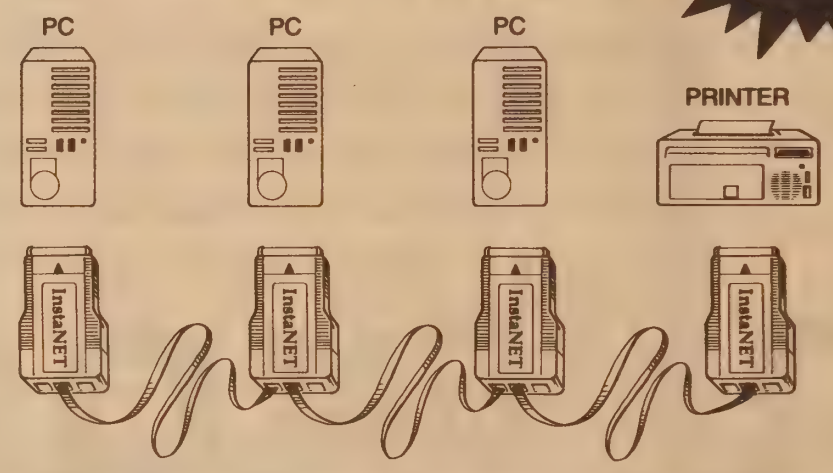

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The Bay Area's Technology Programming

The Locally Produced Silicon Valley Report *Presents An Informative And Timely Look Into The Growing World Of Technology*

BY KIMBERLY GUZEMAN

In its second year, *Silicon Valley Report*, produced by KTEH, the South Bay's public television station, remains one of only a few technology-focused programs. For its second year, *Silicon Valley Report* is reaching a growing audience, being broadcast in additional cities, including Boston, Honolulu, and Austin.

During its first year the show's format was like the evening news. Instead of covering different areas such as sports and the weather, *Silicon Valley Report* covered the technological news of the week. Mixed in were several feature stories, making it a technological cross between the evening news and *Entertainment Tonight*. For the new year, the management of KTEH decided to change the format of the show, opting for more features and fewer news stories.

The beginning of each thirty-minute show, aired Thursday nights at 9:00 pm on KTEH Channel 54, is devoted to that week's major technology news. Afterwards, *Silicon Valley Report* presents its feature stories. These stories can cover anything from pen-based computing to the question of privacy in the age of computers. One recent story looked at why American high-tech products are not doing well in Japan, followed the next week by a discussion on gene mapping and how it is changing.

Silicon Valley Report also does longer reports on timely topics. The week before the Michaelangelo virus was scheduled to strike PCs there was a segment on the virus and which companies were offering free antiviral software. The week the virus hit the show included short news clips on people who had already been affected by the virus because of misprogrammed clocks.

Four roundtables have been scheduled for this season. Selected and hosted by John Crump, the show's host and producer, they include CEOs and computer analysts. On March 12, for instance, the topic was on entrepreneurship. At the end of January, Bob Herwick of Hambrecht & Quist, Nancy McSharry of International Data Corporation, and Tim Bajarin of Creative Strategies joined Crump in a discussion exploring the changing state of the computer industry.

The show's four full-time staff members are supplemented by freelance writers, such as Jim Mitchell and Evelyn Richards. The producers feel it is important to bring in knowledgeable writers to contribute to the diversity of topics covered in the show.

One of the things Crump hopes to add in the near future are reports by Steve Roberts. Roberts spent eighteen months traveling around the Bay Area on a high-tech bicycle that sported a built-in Macintosh computer and keyboard on the handlebars of the bike. Crump feels that Roberts is a "high-tech Charles Karult." Now, they just need to figure out a way for Roberts to take a video camera with him on the road to record his travels.

Crump feels that *Computer Chronicles* is the only other show like his. But *Chronicles* is directed to hardware and software users, and according to Crump, the difference between the two is that, "We're looking at everything, from chips to basic research to computers to software to biotechnology to aerospace." Crump is quick to point out that he would like to see the show eventually go back to a stronger news format, with the features stories not being as prominent.

While the show is produced in San Jose it is not confined to California. This season the show went to Tokyo, Japan. That show, broadcast on January 23, explored the changing roles of women in Japan and how these women balance their traditional role in the family with their growing numbers in the Japanese workforce. While Crump would like to see more segments from across the country as well as the world, the small size of his staff and budget preclude him from doing so.

This season, *Silicon Valley Report* has twenty-six programs scheduled, but funding for only twenty. While the city of San Jose provides a major portion of this funding, if KTEH cannot come up with the rest of the money they need, the show will be forced to take a hiatus while it builds up a financial base. The program gives us a useful, informative look into the world of technology, and its lack of funding might become its unfortunate downfall. ■

With the aid of stereoscopic eye phones and a data glove, John Crump, host of KTEH-54's Silicon Valley Report, chases away computerized jellyfish and sharks in Fujitsu's virtual reality laboratory near Tokyo.

RESOURCE:
KTEH, Channel 54
100 Skyport Dr.
San Jose, CA
95110-1301
(408)437-5454

It can also be seen on:
KVCR, San Bernardino, CA
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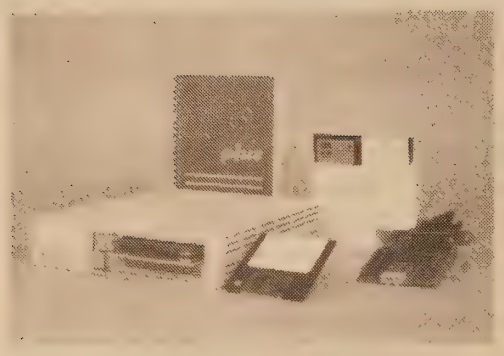
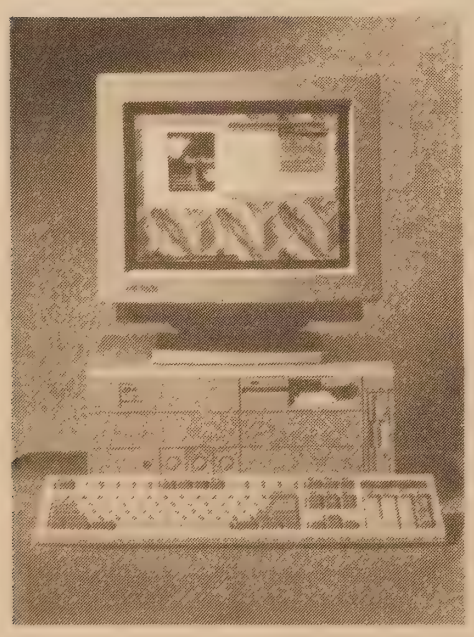


The SpecPak CT5250 is a complete .25" tape backup subsystem that backs up 250MB of data on a single cartridge utilizing a parallel port of a PC AT, laptop, or notebook computer. Fully compatible with MS-DOS 5.0, it also runs under Novell NetWare 286 and 386. SpecPak eliminates the need for a controller card and expansion slot in your PC and still permits the I/O connection to a printer. This is achieved either by an external Y connector to the parallel port or connected through a SCSI port. The system is integrated with DosArch plus menu driven software that makes installation and use easy. ($995) Systems Enhancements, Inc., 780 Montague Expwy., Suite 208, San Jose, CA 95131-1316. (408)944-9670.



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By selecting components for performance, reliability, and specifications, rather than name, JDR Microdevices produces top-quality products at great savings to the customer. Based on 486, 386, and 386SX microprocessors, these new systems provide everything necessary, including MS-DOS and Windows, which come installed and preconfigured. Each system features a non-interlaced, flicker free, 1024 x 768 monitor, 4MB of RAM (expandable to 32MB), 120MB internal hard drive, 5.25" 1.2MB and 3.5" 1.44MB floppy drive, 101-key keyboard, and serial mouse. (Standard 386DX system is priced at $1799) JDR Microdevices, Inc., 2233 Branham Lane, San Jose, CA 95124. (408)559-1200.

SOFT-HARD POWER BOX

The new AMI-based Power Box Series I system includes clock doubling, which allows the user to add an Intel

Continued

PRODUCT UPDATES

➤**Berkeley Systems** released **After Dark 2.0 for Windows** with over forty screen-saving displays. For customers who purchased After Dark before December 1, 1991, the upgrade price is $14.95, including shipping and handling. Berkeley Systems, Inc., 2095 Rose St., Berkeley, CA 94709. (510)540-5535.

➤**Claris** announced a promotional offer bundling **In Control**, an innovative to-do list manager from **Attain Corp.**, with **MacProject II**. The bundle will be available through July 31, 1992. Claris Corp., 5201 Patrick Henry Dr., Box 58168, Santa Clara, CA 95052-8186. (408)987-7000.

➤**Claris** is shipping **Resolve 1.1**, an update to its Macintosh spreadsheet. Registered owners may update for $20. Claris continues to offer a trade-up price of $99 for owners of Excel, Lotus 1-2-3, Borland Full Impact, and Informix Wingz.

➤**Computer Associates** announced **CA-Cricket Graph v2.0 for the Macintosh**, a graphing package that allows business, scientific, and engineering users to analyze data and create high-quality charts. Computer Associates International, Inc., 711 Stewart Ave., Garden City, NY 11530-4787. 1-800-645-3003.

➤**Gupta Technologies** announced upgrades to its entire **SQLNetwork family of connectivity software**. The primary announcement is for **v3.0 of SQLNetwork for DB2**, a significantly enhanced version that enables LAN-based client PCs to access data on IBM mainframes. Gupta Technologies, Inc., 1060 Marsh Rd., Menlo Park, CA 94025. (415)321-9500.

➤**Quadtel's QMAPS v2.1** memory management upgrade now provides PC users with a minimum of 32K of additional upper memory, and as much as 64K when a Quadtel BIOS is installed. Quadtel System Software Corp., 3190-J Airport Loop, Costa Mesa, CA 92626. (714)754-4422.

➤**Sybase Open Server Release 2.0** enhances and simplifies Sybase's data integration capabilities, enabling a new class of applications that can combine diverse data resources. Sybase, Inc., 6475 Christie Ave., Emeryville, CA 94608. (510)596-3500.

➤**System Plus** introduced **The Medical Manager v7.10** for UNIX and XENIX. Versions running under DOS, Concurrent DOS, and most networks will be available within the next few months. System Plus, Inc., 500 Clyde Ave., Mountain View, CA 94043. (415)969-7047.

➤**WordStar** introduced **WordStar for DOS v7.0**. Registered users of previous versions can upgrade for $89. WordStar is also offering the upgrade to users of either Microsoft Word or WordPerfect until June 30, 1992. WordStar International, Inc., 201 Alameda Del Prado, Novato, CA 94949. (415)382-8000.

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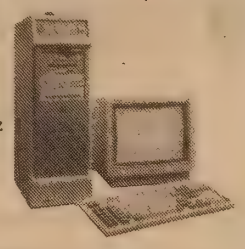

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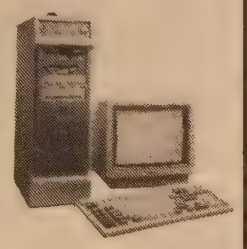

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*64KB WriteBack Cache (up to 256 KB)
*4MB DRAM (up to 32MB)
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*Trident 8900C 1024x768 w/1MB SVGA Graphic Card
*TEAC 1.2MB Floppy Drive
*SONY 1.44MB Floppy Drive
*101 Enhanced Keyboard
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*2HD/2FD IDE Controller w/ 2 serial,1 parallel & 1 game
*Tower Case w/285 Watts Power Supply
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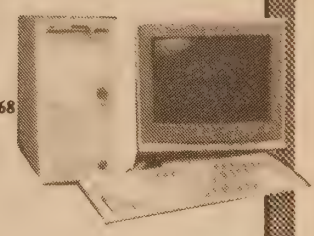

*Intel 386-33/AMD 386-40
*64KB WriteBack Cache (up to 256 KB)
*4MB DRAM (up to 32MB)
*105MB 16ms IDE Hard Drive
*SAMSUNG SyncMaster 3 1024x768 0.28dp SVGA Monitor
*Trident 8900C 1024x768 w/1MB SVGA Graphic Card
*TEAC 1.2MB Floppy Drive
*SONY 1.44MB Floppy Drive
*101 Enhanced Keyboard
*Logitech Dexxa Mouse
*2HD/2FD IDE Controller w/2 serial,1 parallel & 1 game
*Mini Tower Case w/230 Watts Power Supply
*Microsoft DOS 5.0

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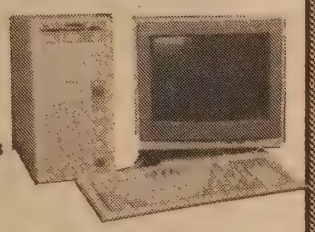

*386-25MHz
*2MB DRAM (up to 8MB)
*80MB 16ms IDE Hard Drive
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*Trident 9000 1024x768 SVGA Graphic Card w/512KB
*5.25" 1.2MB Floppy Drive
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*101 Enhanced Keyboard
*Microsoft compatible mouse
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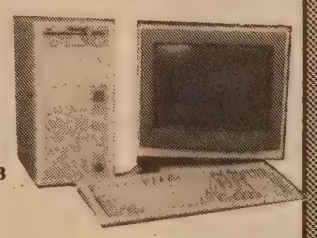
386SX-25MHz w/32K Cache SVGA 40MB HD



*AMD 386SX-25MHz
*32KB WriteBack Cache (up to 64KB)
*2MB DRAM (up to 16 MB)
*40MB 22ms IDE Hard Drive
*Super VGA 1024x768 0.28dp Color Monitor
*Trident 9000 1024x768 SVGA Graphic Card w/512KB
*5.25" 1.2MB Floppy Drive
*3.5" 1.44MB Floppy Drive
*101 Enhanced Keyboard
*Microsoft compatible mouse
*2HD/2FD IDE Controller w/1 serial,1 parallel & 1 game
*Mini Tower Case w/230 Watts Power Supply
*Microsoft DOS 5.0

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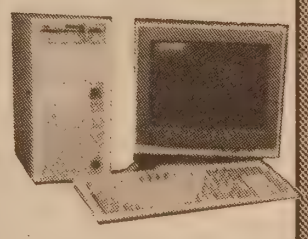
386SX-16/25MHz SVGA 40MB HD



*AMD 386SX-16/25MHz
*1MB DRAM (up to 16MB)
*40MB 22ms IDE Hard Drive
*Super VGA 1024x768 0.28dp Color Monitor
*Trident 9000 1024x768 SVGA Graphic Card w/512KB
*1.2MB Floppy Drive or 1.44MB Floppy Drive
*101 Enhanced Keyboard
*Microsoft compatible mouse
*2HD/2FD IDE Controller w/2 serial,1 parallel & 1 game
*Mini Tower Case w/230 Watts Power Supply

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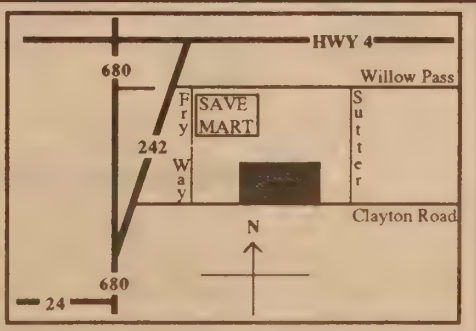
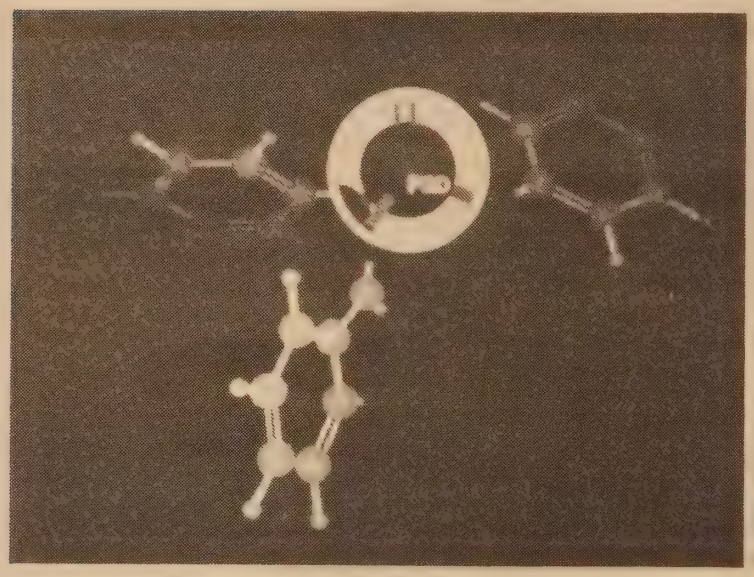


approved chip to double the operating speed of the CPU. This 20MHz, 486SX-based system comes standard with 4MB of RAM, 64K cache, Teac 1.2 and 1.44MB floppy drives, a Maxtor 120MB internal hard disk drive, a Diamond Speedstar Graphics adapter with 1MB of RAM, a ViewSonic 14" non-interlaced SVGA monitor, and an enhanced keyboard. A super fast I/O is achieved from embedded controllers on the motherboard. ($2049) Soft-Hard Systems, Inc., 6301 De Soto Ave., #C, Woodland Hills, CA 91367. 1-800-899-8269.

PC SOFTWARE

CHEMVISION FOR WINDOWS

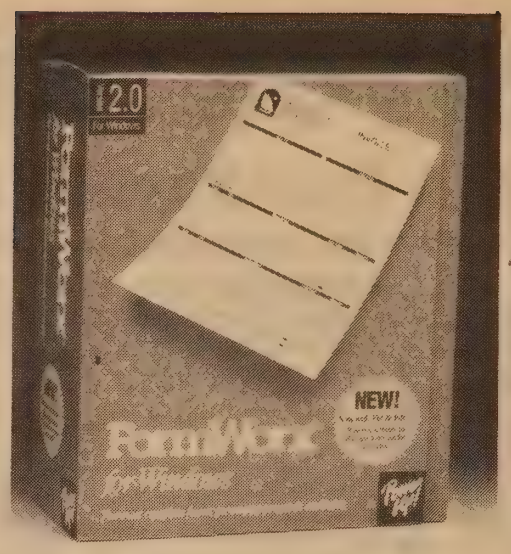
chemVISION Release 1.1 is a powerful PC tool for 3-D rendering with chemical query capabilities designed for scientists in



chemical research. With chemVISION chemists can easily display and render molecular structures in three dimensions, move and scale the molecule in 3-D space, make expert queries of their molecule, illustrate research documentation, and produce presentation-quality output. The Windows graphical interface helps make chemVISION easy to learn and use. By integrating all the necessary visualization tools under a single-user interface, scientists save time and money. (A single-user license is priced at $299) Molecular Arts Corp., 1532 E. Katella Ave., Anaheim, CA 92805. (714)634-8100.

FORMWORX FOR WINDOWS

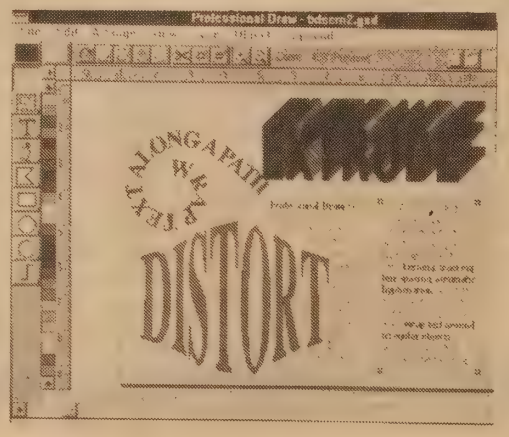
By integrating the latest features in forms software, FormWorx for Windows can be used by small businesses or corporate professionals for efficiently processing forms with a PC. It includes a WYSIWYG screen



display, object-oriented forms design, and five hundred ready-to-use forms. Its unique object-oriented design technique lets users piece together different form parts such as address labels, lists, and grids. FormWorx for Windows includes Fill & File, software for fast and accurate data entry. Fill & File also provides a dBASE-compatible database manager, allowing users to manage their data right from within the program. Users can print data into existing preprinted forms, or to print new forms and data together onto blank paper. For high-volume printing, a search and locate feature allows automatic batch printing. ($299.99; FormWorx for DOS, $159.95) Power Up Software Corp., 2929 Campus Dr., San Mateo, CA 94403. (415)345-5900.

GOLD DISK PROFESSIONAL DRAW

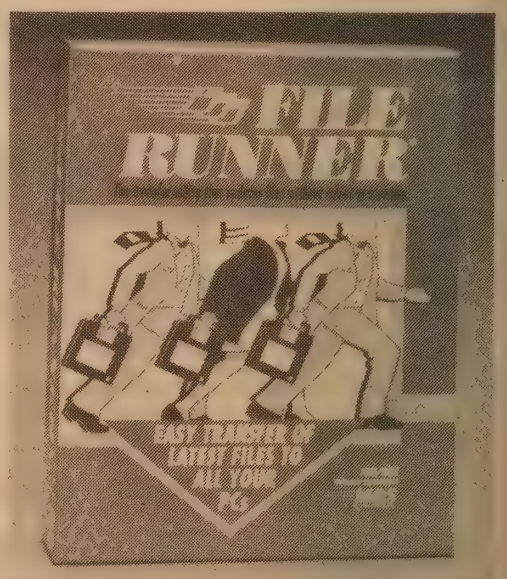
Professional Draw is a comprehensive Windows-based graphics illustration and page layout software program setting new levels of price value, functionality, ease-of-use, and performance. It offers extensive desktop publishing and type handling



capabilities, including multiple page layout, text flow through multiple frames, text wrap, text on a curve, and support for all major font types in native mode, such as Adobe Type 1, TrueType, and Corel .WFN font files. Professional Draw imports drawings from and exports to most major file formats, and provides extensive freehand and drawing capabilities. ($495. Users of CorelDraw, Arts & Letters, PageMaker, Ventura Publisher, and QuarkXpress can purchase Professional Draw at a special price of $129) Gold Disk, Inc., 20675 S. Western Ave., Suite 120, Torrance, CA 90501. (310)320-5080.

LAST RESORT FOR RECOVERING LOST TEXT

Last Resort is a software utility that records every keystroke to a file on the user's disk. When the user needs to recover text, Last Resort will create an ASCII file that can be opened and edited using any word processor. Unlike other programs designed to try to recover documents that were saved and deleted, Last Resort allows the user to recover text that has been typed and deleted, but never saved. According to Dave Johnson, president of Working Software, "Most of the time text is lost because of simple errors. You just finished typing a three-page report and accidentally kick the power cord before you save. All the backup programs in the world won't save you then—but Last Resort will." ($49.95) Working Software, Inc., 740 Front St., Suite 318A, Santa Cruz, CA 95060. (408)423-5696.



MBS FILERUNNER

FileRunner solves the critical problem of how to safely get the latest version of your documents onto all of the PCs you use. Designed to automate and safeguard file transfer, this easy-to-use program does not require any cables, modems, or network software. It uses a floppy disk and the Overwrite Safeguard algorithms to transfer and maintain identical files on each computer. Overwrite Safeguard also detects when a file has been altered on one or more computer and gives you the opportunity to keep both copies for later review. After initial setup, FileRunner automatically knows how and where to find your files. All you must do is type two keys, F10 and Y, on your computer. And since diskettes are the transfer medium, the FileRunner program automatically provides a backup of your critical files. ($99.95) MBS Technologies, Inc., 34 W. Sycamore, Arcadia, CA 91006. 1-

Continued

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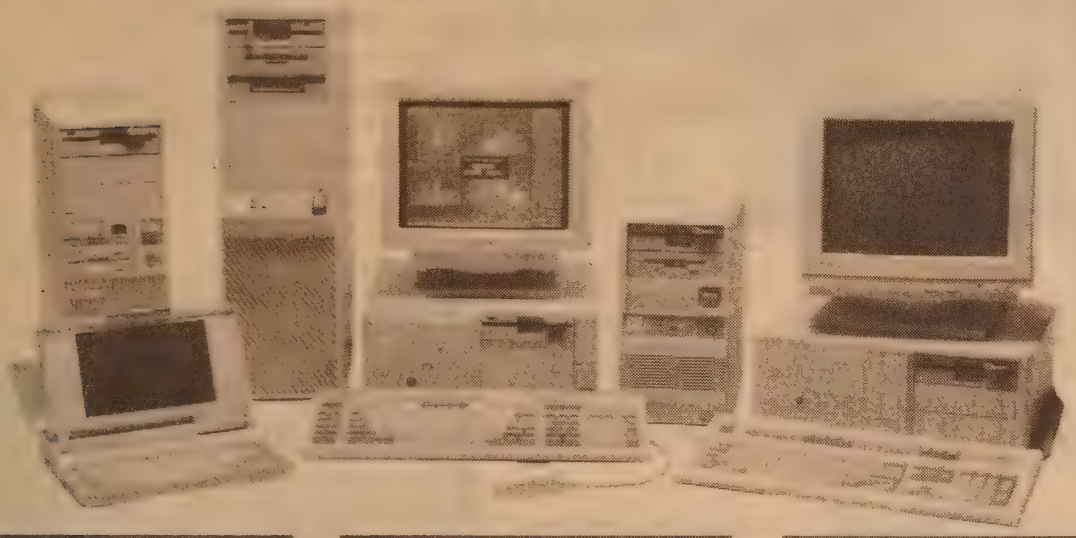

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* Serial/Parallel/Game Card
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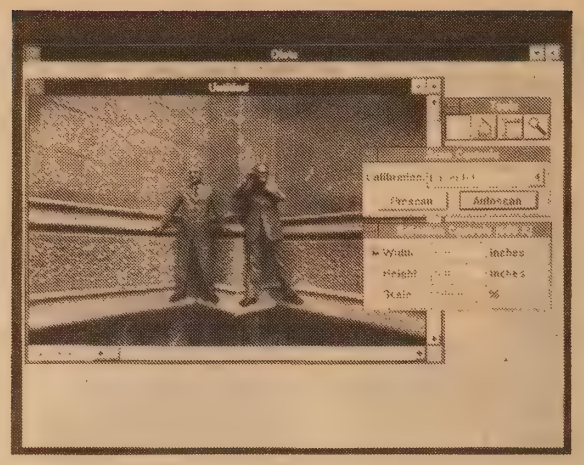
OFOTO FOR WINDOWS

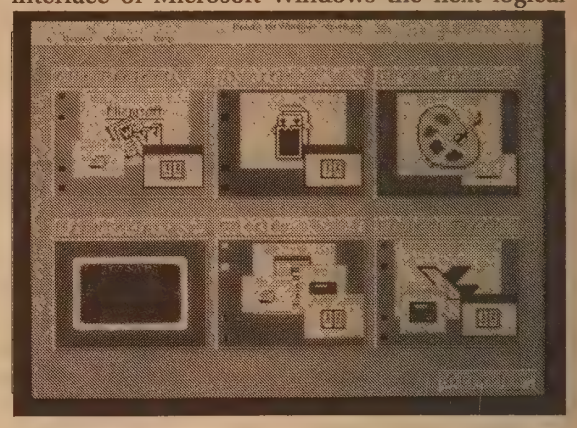
Ofoto software fully automates the scanning process, producing an accurate reproduction of grayscale images at the touch of a button. First introduced for the Macintosh in October 1991, Light Source has announced a new version for PCs running Windows. With Ofoto, the user places the



original image onto the scanner bed, selects the printer to be used, and presses the return key. Ofoto AutoScan and AutoSharpen does the rest. Smart-Pixel Processing allows Ofoto to greatly reduce the size of image files by eliminating unusable and unnecessary data early on, storing only the critical pixels. Designed to maximize productivity, Ofoto's image manipulation tools allow cropping, scaling, rotating, and sharpening to be performed during the scanning process. ($395) Light Source, Inc., 17 E. Sir Francis Drake Blvd., Suite 100, Larkspur, CA 94939. (415)461-8000.

ROOMS FOR WINDOWS

Rooms for Windows takes the window-based interface of Microsoft Windows the next logical



step—organizing information the way people work on a real desk, not the way a computer display forces people to work. Each Room contains several windows, and functions like a separate computer monitor, or virtual desktop, devoted to a specific task, client, or project. Rooms for Windows provides an easy way to navigate between tasks and manages DOS and Windows applications from a common interface. When the computer is turned on, every Room, application, icon, file, and window placement the user was working with is automatically loaded into memory and displayed. Changes to an object in one Room can, if desired, affect all copies of that object in all Rooms. ($99) XSoft, a division of Xerox Corp., 3400 Hillview Ave., PO Box 10034, Palo Alto, CA 94303-0816. 1-800-626-6775.

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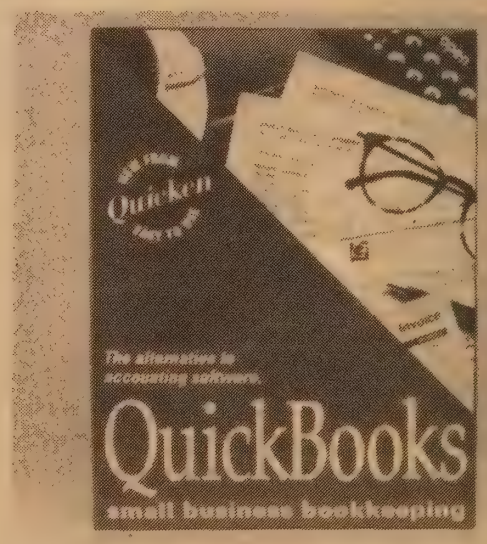

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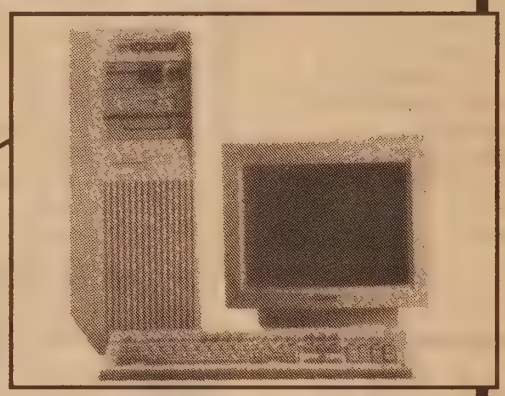

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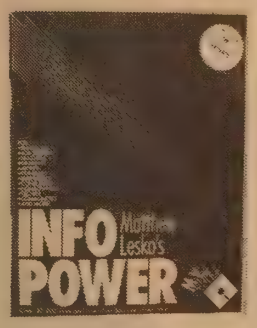

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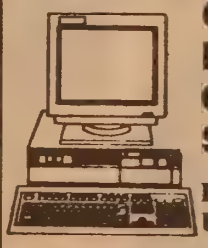

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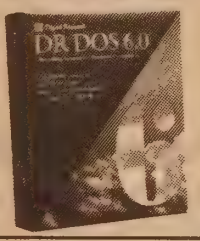

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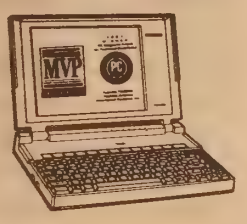

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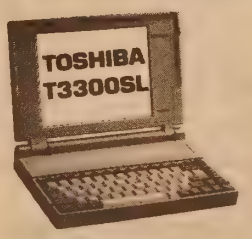

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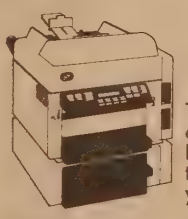

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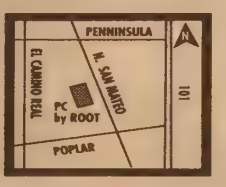

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NEW ALTIMA 486 NOTEBOOKS

Altima has designed three new notebook computers to give power users a choice. The Altima 420 and 425

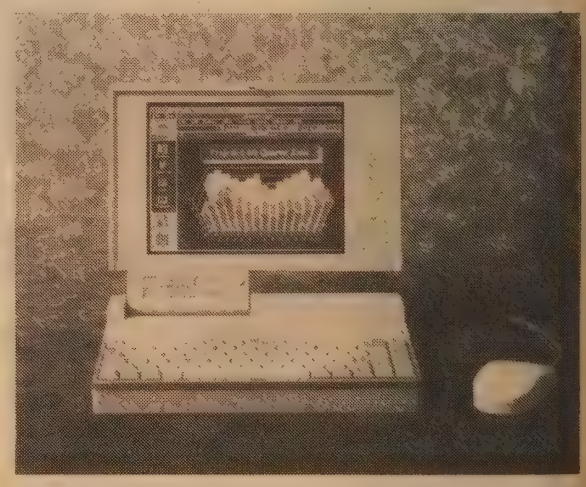
computers feature the 80486SX processor with an 80MB internal hard drive. The Altima 433 uses an 80486DX chip and also comes standard with an 80MB internal hard disk. All models have an 8K internal cache, 4MB of RAM (expandable to 20MB), and a 3.5" 1.44MB internal floppy drive. They weigh only 5.7lbs., including the battery pack. VGA-compatible, the 10" backlit LCD screen shows sixty-four-level grayscaling with 640 x 480 resolution. When you connect these notebooks to an external monitor, screen resolution increases to 800 x 600. The 84-key keyboard has dedicated keys for Home, Page Up, and Page Down. An embedded numeric keypad and F11/F12 support are included. (The Altima 420 has a suggested retail price of $2799; the 425, $2999; and the 433, $3499) Altima Systems, Inc., 1390 Willow Pass Rd., Suite 1050, Concord, CA 94520. (510)356-5600.

COMMAX LIGHTWAVE

LightWave is a fully featured 33MHz, 486 notebook computer that brings workstation performance to mobile computing. Weighing under 6lbs., including an internal rechargeable battery, this unit measures only 8.6" x 11" x 1.6". A 10" backlit, CCFT Super-Twist LCD screen offers sixty-four shades of gray with 640 x 480 resolution. Other features include 4MB of RAM (expandable up to 16MB), a 3.5" 1.44MB floppy disk drive, 80MB hard disk drive, an internal fax/modem connector port, external SVGA port 16-bit controller, 84/85-key full-sized keyboard, embedded numeric/editing keypad, and MS-DOS 5.0. ($3395 with 80MB hard disk drive and 4MB of RAM) Commax Technologies, Inc., 2031 Concourse Dr., San Jose, CA 95131. 1-800-526-6629. (408)435-5000.

EPSON NB-SL/20

The Espon NB-SL/20 packs full 286 desktop power



into notebook proportions with Intel's 20MHz, 386SL microprocessor, a 64K cache, and 2MB of RAM, expandable to 14MB. Flexibility is maximized by removable hard disk drives. This allows users to easily transfer data among different NB-SL units, or use the hard drive with a desktop PC via an adapter. For added security, removable drives can be stored in a secured environment. Intel's SL technology incorporates power-management capabilities for longer battery life. Epson's ROM-based Maximizer software optimizes those capabilities through Standby and Auto Suspend modes that shut down portions of the computer when not in use. (List price is $2579 for the notebook and $520, $720, and $1020, respectively, for 40MB, 60MB, or 80MB removable hard drives) Epson America, Inc., 20770 Madrona

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IIT

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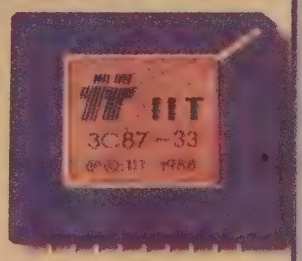

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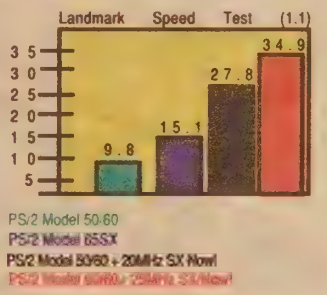

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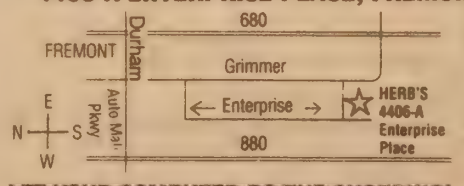

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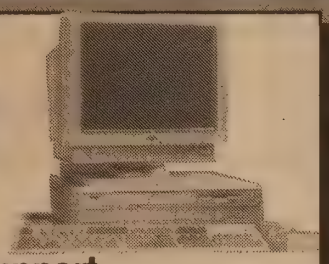

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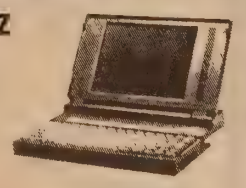

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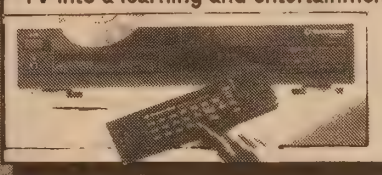

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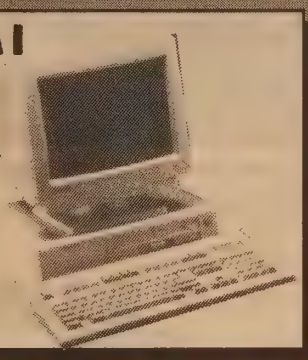

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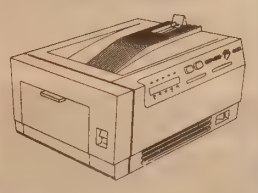

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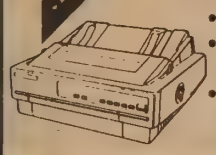

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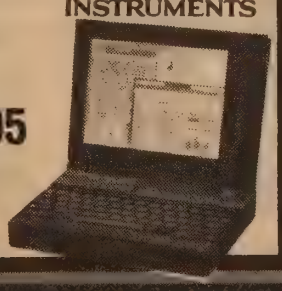

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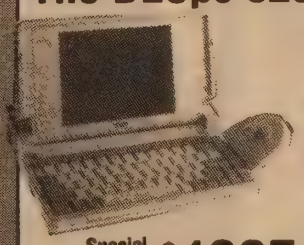

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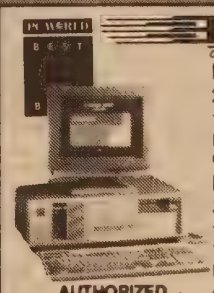

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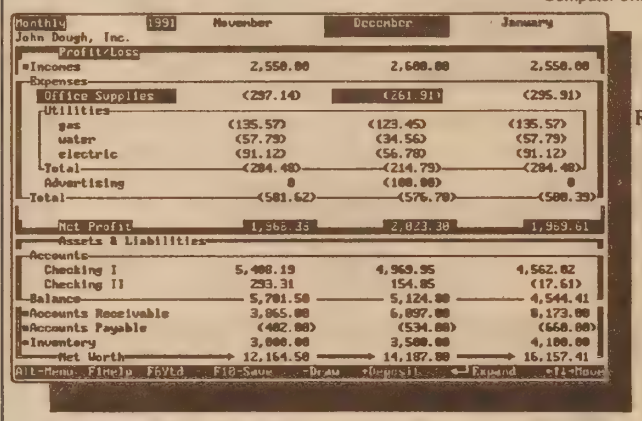

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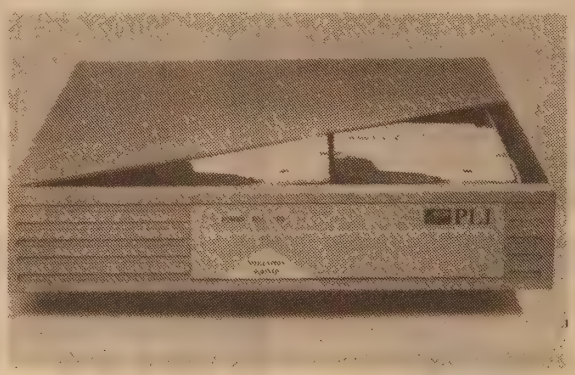

MACINTOSH SOFTWARE

THE VIEW FROM EARTH CD-ROM

The View From Earth is the first in a series of interactive CD-ROM science discs from Warner New Media based on Time Life Books' *Voyage Through the Universe* series. This interactive documentary shows how the Sun, the Moon, and the Earth aligned for the July 11, 1991, solar eclipse. From the narrated tours, users can branch off to special sections including an Eclipse Tracker that displays a map of the world to show the paths of past, present, and future solar eclipses—from 1940 to 2040. The Anatomy of an Eclipse section explains what causes eclipses and why they don't happen every month. ($79.98) Warner New Media, 3500 Olive Ave., Burbank, CA 91505. (818)955-9999.

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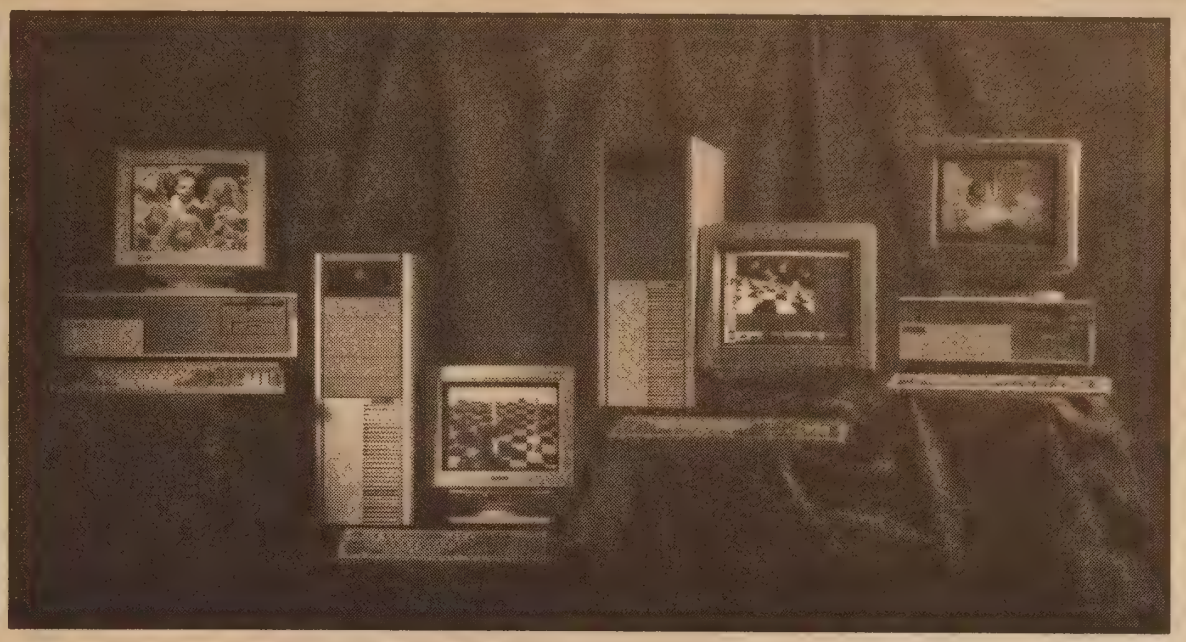

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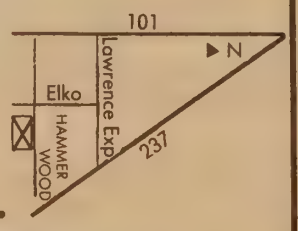

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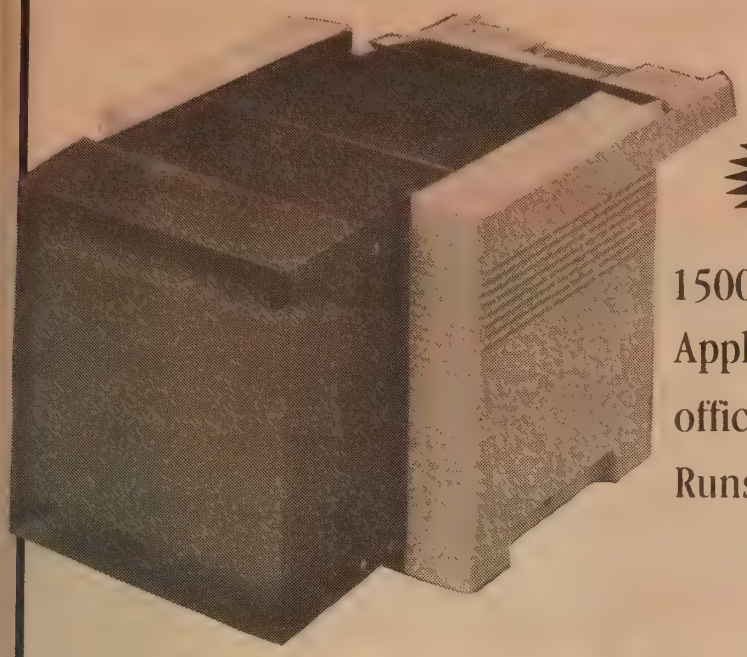

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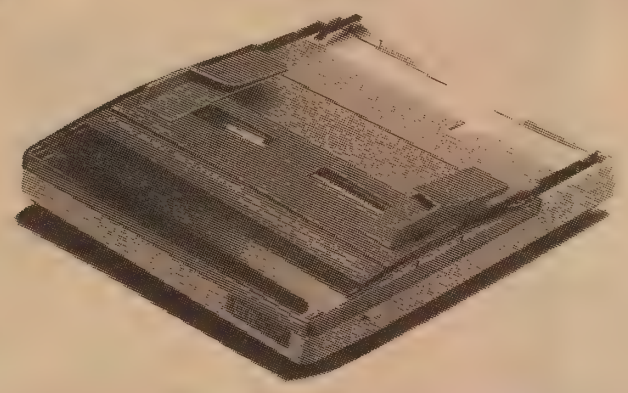

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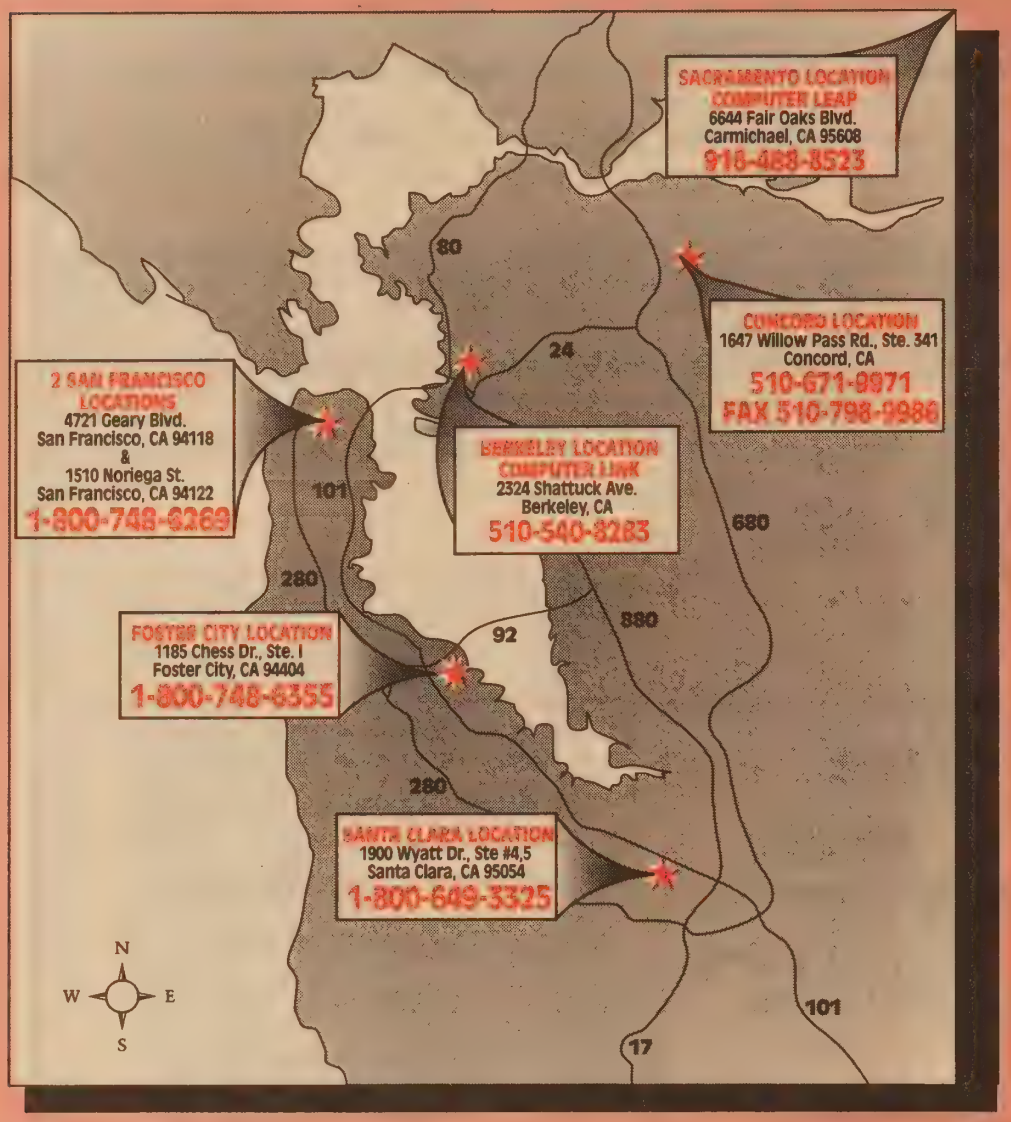

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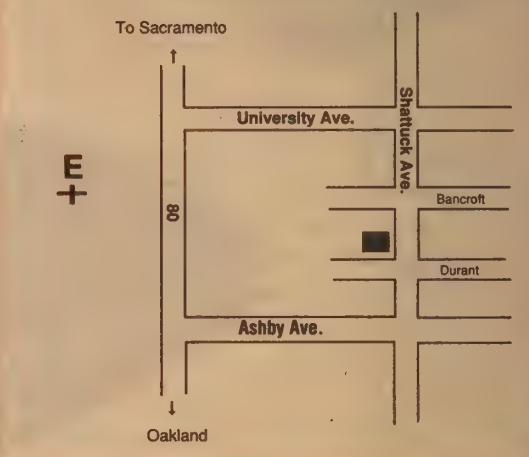

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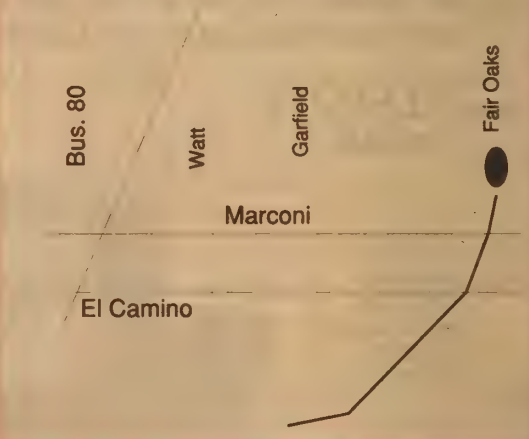

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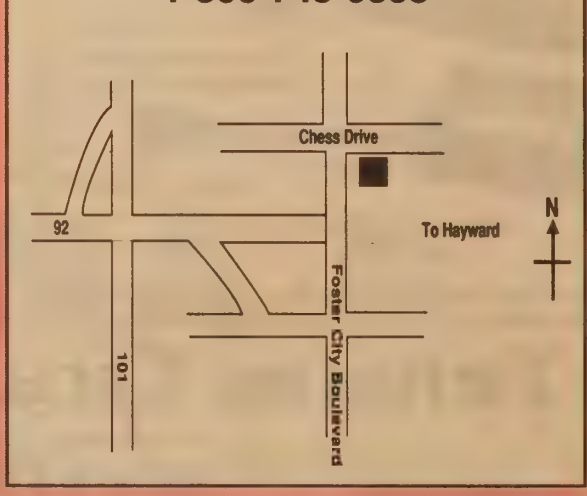

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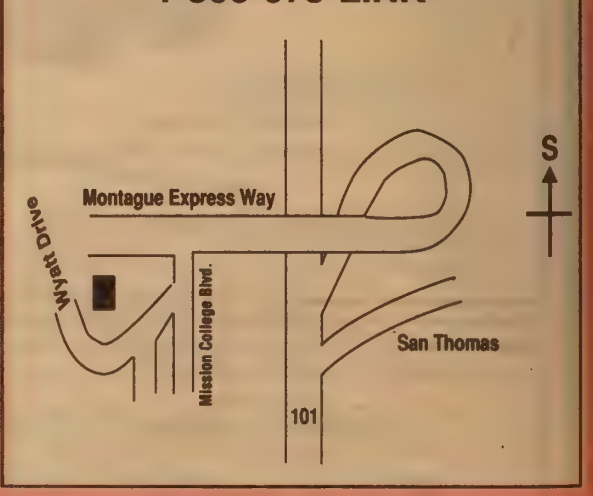

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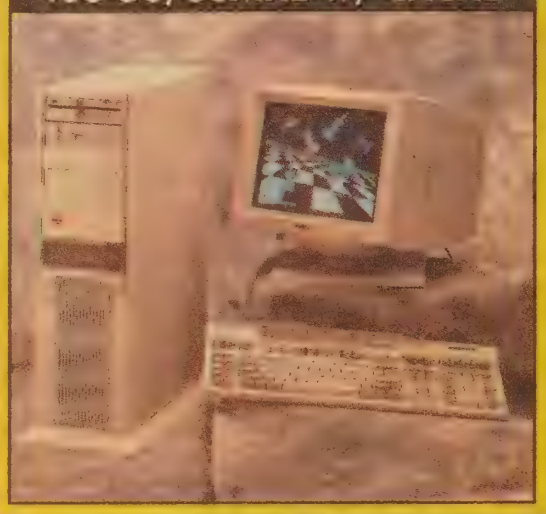

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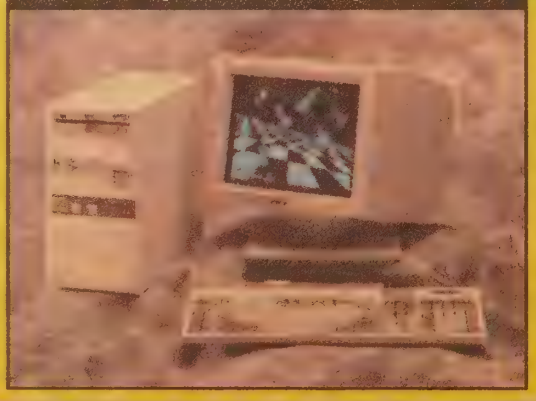

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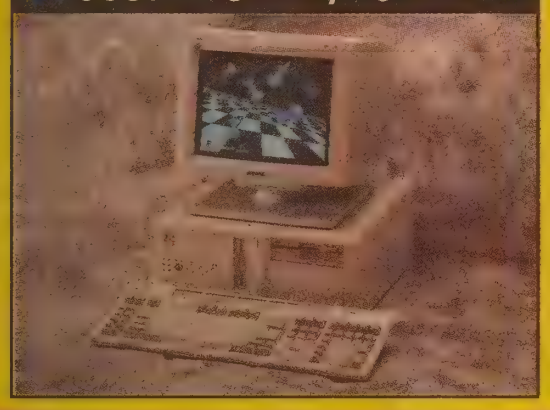

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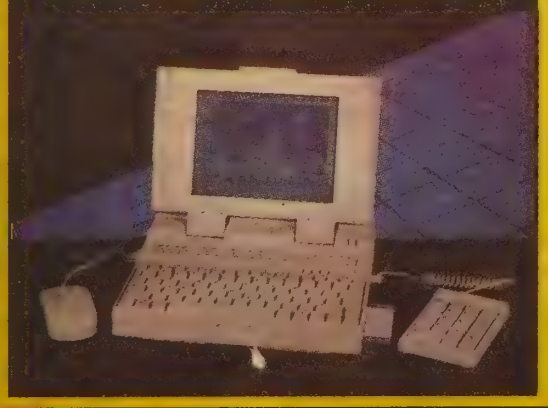

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PRODUCT SPOTLIGHT

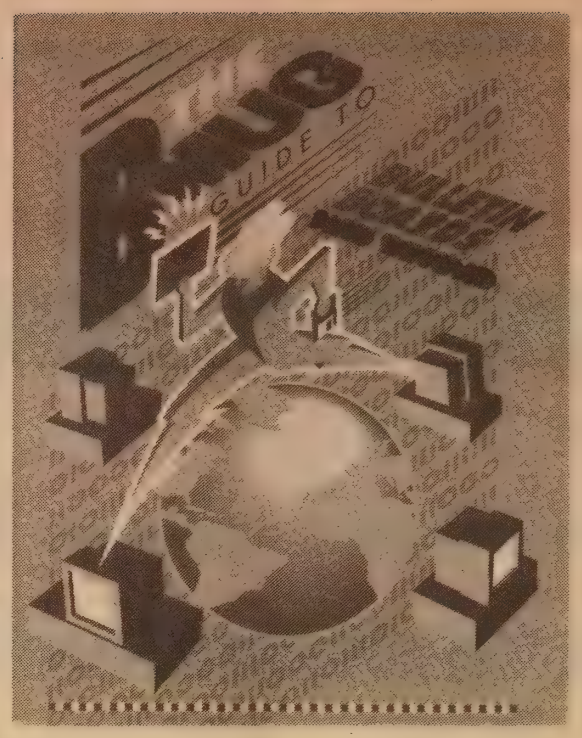
Continued from page 172

applications. Author Naba Barkakati offers examples based on Sun Microsystem's popular

OpenWindows environment. These examples define each function and its result. ($27.95) Prentice Hall Computer Publishing, Simon & Schuster Business and Professional Group., 11711 N. College Ave., Carmel, IN 46032. (317)573-2583.

THE BMUG GUIDE TO BULLETIN BOARDS AND BEYOND

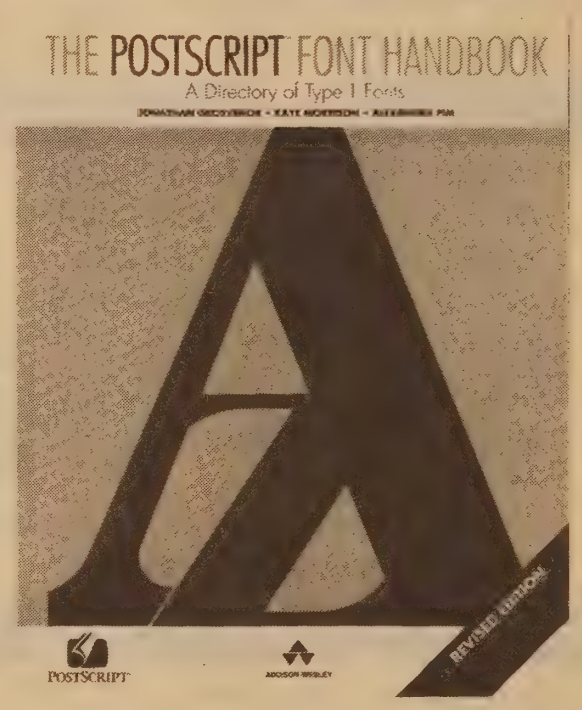
Computers have linked up around the world to create networks of amazing capabilities. New services, online libraries, distributed conferences, technical support, real-time conversation, email, and huge software libraries are just some of the services in the expanding telecommunications universe explored by *The BMUG Guide to Bulletin Boards and Beyond.* This book is designed to appeal to all experience levels. There is a Quickstart section for beginners, an appendix with useful reference information such as a telecommunications bibliography, a guide to telecommunications products, a BBS network section providing guides to the Internet, FidoNet, and RIME conference



networks, and a BMUG BBS Reference. ($23) BMUG, Inc., 1442A Walnut St., #62, Berkeley CA 94709-1496. (510)540-1029.

THE POSTSCRIPT FONT HANDBOOK, REVISED EDITION

As the Adobe PostScript page description language has become an industry standard it has provided a framework for the development of electronic font type libraries. This new edition of *The PostScript Font Handbook* provides a comprehensive directory of all the reputable fully hinted Type 1 PostScript fonts available on floppy disks as of July 31, 1991. In addition to the directory, the authors have included a series of explanatory articles on such topics as the history of typography, font selection and application, basic page design and layout, different font formats, the history of PostScript, and "what's so special about Type 1 fonts?" ($24.95) Addison-Wesley Publishing Co., Reading, MA 01867. (617)944-3700.



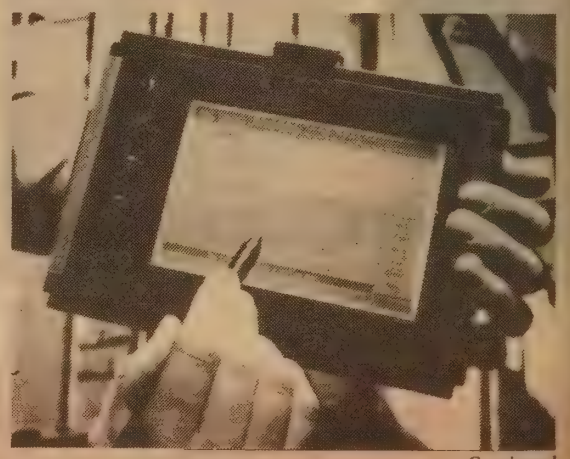
PC LEARNING LABS TEACHES DOS 5

Written with the beginner in mind, this hands-on instruction book is designed to help you attain a high level of DOS 5 fluency in as short a time as possible. Each chapter covers one broad topic or set of related topics. Chapters are arranged in order of increasing DOS proficiency; skills acquired in one chapter are used and elaborated upon in later chapters. Mixing theory with practice, each topic is explained and then immediately drilled in a hands-on activity. The included Data Disk contains sample files to use in these activities. When you're done working your way through this book, you will have a solid foundation of skills in DOS file management, DOS commands and techniques, and the DOS Shell. ($22.95) Ziff-Davis Press, 5903 Christie Ave., Emeryville, CA 94608. (510)601-2000.

PEN COMPUTING HARDWARE

GRID PALMPAD

The PalmPAD is a rugged pen-based personal computer designed primarily for data collection applications. It has a 9.5MHz NEC microprocessor, MS-DOS 5.0, 2MB of RAM, a slot for high-capacity solid-state storage cards with up to 20MB of storage, nickel metal hydride batteries for eight hours of battery life, and a 6.5" high-resolution 640 x 640 LCD with adjustable backlighting. PalmPAD runs GRiD's MS-DOS-based PenRight! pen computer software. It also features a combined power/serial port and cable. Only one cable is needed to charge the unit and upload or download data via serial communications. Options include a 2400bps fax modem. ($2895) GRiD Systems Corp., 47211 Lakeview Blvd., Fremont, CA 94537. (510)656-4700.



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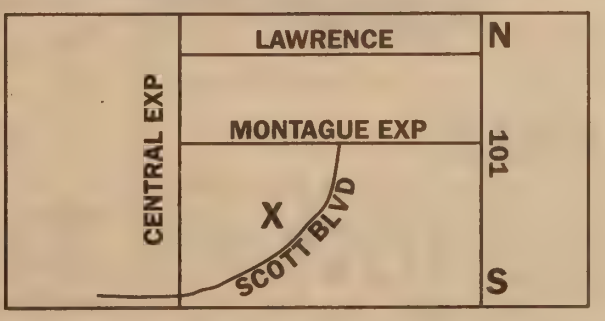

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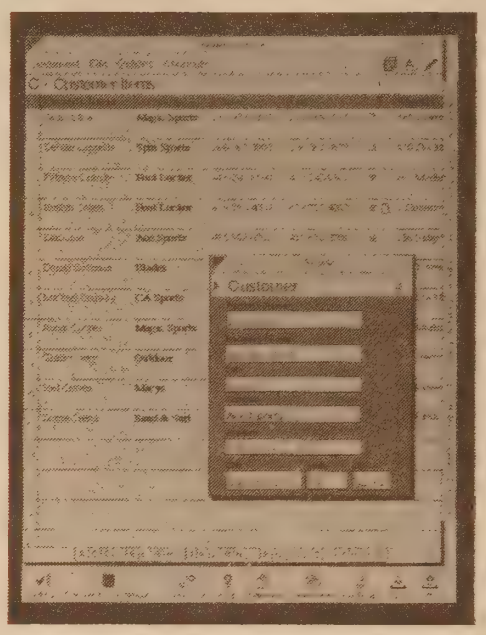
PRODUCT SPOTLIGHT

PEN COMPUTING SOFTWARE

PENSOFT PERSPECTIVE

Perspective, the first pen-based personal information manager, is designed for mobile professionals, particularly those in sales and management who spend a great deal of time away from their desks. Building on an object database, it utilizes a proactive tool called the Associate. The Associate automatically creates links between people, appointments, to-do lists, and information. It will run on the PenPoint operating system from GO Corporation. Perspective's user interface incorporates a familiar style of paper-based stationery, such as a day planner, address book, note taker, and post-its. ($299) Pensoft Corp., 1400 Fashion Island Blvd., Suite 1050, San Mateo, CA 94404. (415)358-1575.



PENMAGIC NUMERO

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SLATE DAY-TIMER PEN-SCHEDULER

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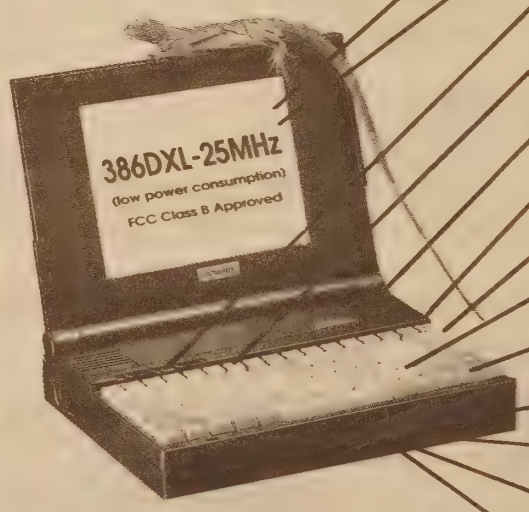

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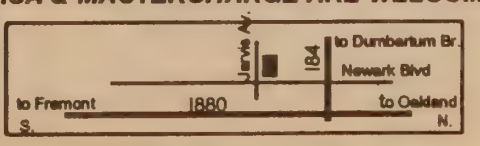

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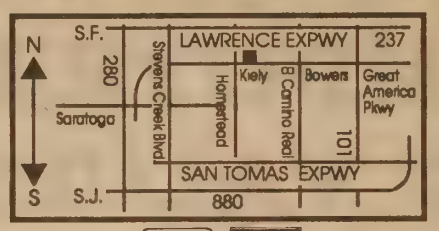

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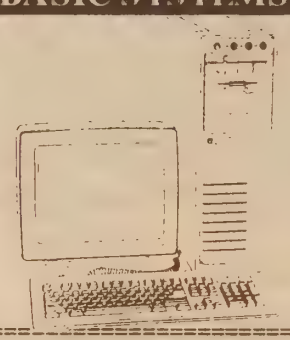

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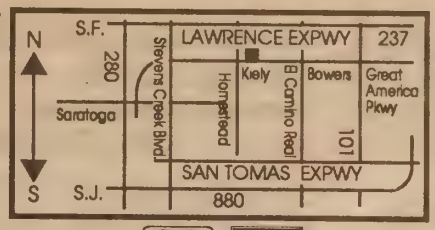

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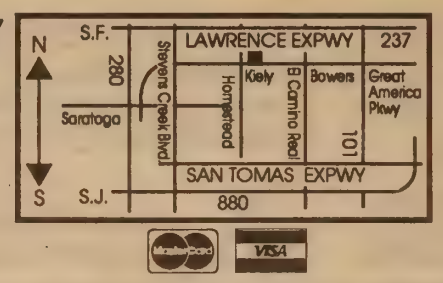

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Continued from page 180

sturdy copy clips for holding documents next to computer screens for easy input and editing ($8.97). Fuji Photo Film USA, Inc., 555 Taxter Rd., Elmsford, NY 10523.

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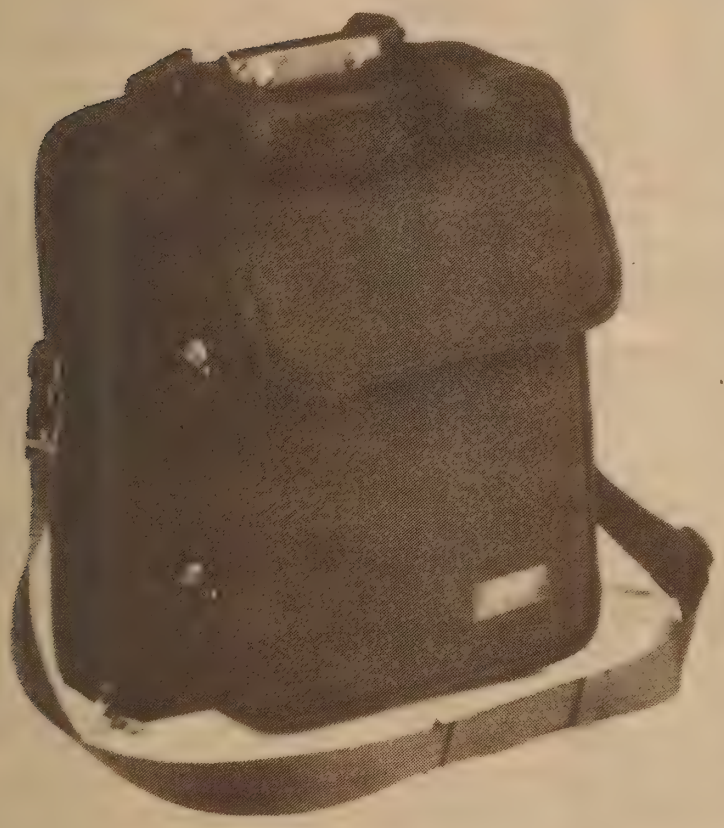

computer. The exterior pocket holds accessories, a power pack, or Diconix thermal printers, while the inside is designed with organizers for pens, folders, and floppy disks. The zipped interior compartments can store travel itineraries and tickets as well as other important documents. ($85) Computer Coverup, Inc., 2230 S. Calumet, Chicago, IL 60616. 1-800-282-2451.

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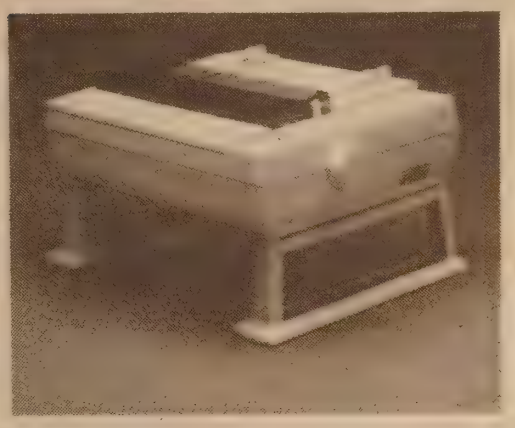
These newly designed legs now support printers at a level, horizontal position that allows for center, front, or rear paper feed. The legs are also universally designed to fit any printer regardless of carriage size. They maximize desk space by raising the printer up off the desk surface, allowing for paper storage underneath. Made of durable, lightweight material, they are equipped with



non-marring, anti-skid rubber feet that serve to suppress noise and vibration against hard surfaces. ($9.95) Curtis Manufacturing Company, Inc., 30 Fitzgerald Dr., Jaffery, NH 03452. (603)532-4123.

REVIEWS

GAME REVIEWS

By Mike Markowitz

THE GODFATHER

Designed By: Creative Materials
Published By: US Gold
Distributed By: Accolade
For: MS-DOS (EGA, VGA, AdLib, and Roland sound boards supported), Amiga version also available
List price: $49.95

The odds are stacked against any computer game that is tied in to a movie. Typically the developer has to pay so much for the rights to use the title and box-cover artwork that little budget is left over for programming. Hollywood studio execs and lawyers, with no understanding of game design, sometimes wind up with creative control over what finally reaches the small screen.

The Godfather is a shoot-em-up arcade game based on Francis Ford Coppola's three epic films, which were based on Mario Puzo's novel of the same name. The game proceeds through a series of levels—1940s New York, 1950s Las Vegas, 1960s Havana, and 1970s Miami. You shoot the bad guys and collect objects that help you reach the next level. The graphics are stylish and evoke the different settings and decades very well.

This game uses a code wheel for copy protection. Documentation was a mess—a crude leaflet for the Amiga version with the needed IBM instructions on a hastily printed and confusing errata sheet. The IBM version appears to be a market-driven port of something that worked a lot better on the Amiga, where sprites (animated bit-maps) are directly supported by the video hardware. There is no provision for mouse control—and the keyboard controls are so awkward that you really need a joystick to play.

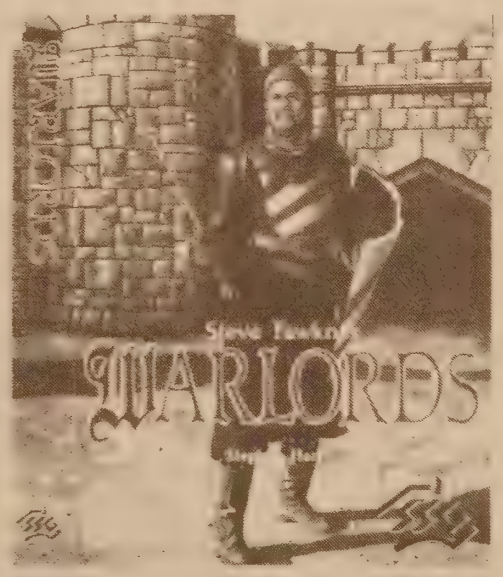
Overall, this Godfather makes MS-DOS users an offer they definitely can refuse. Now I can just see the headline, "Game Reviewer's Kneecaps Shot Off By Unknown Gunmen."

Graphics and Animation: 8
Sound: 7
User Interface: 4
Overall Value: 4

WARLORDS

Designed By: Steve Fawkner
Published By: Strategic Studies Group
For: Macintosh (Plus to Quadra) requires 1MB for monochrome, 2MB for color; System 7 compatible
List Price: $59.95

Warlords is a sophisticated strategy game with the flavor of J.R.R. Tolkein's sword-and-sorcery epic *Lord of the Rings*. You command one of eight powers, contending for control of the mythical land of Illuria. There are impassable mountains, mighty rivers, deep forests, and one offshore island. The land is dominated by eighty castles and littered with ruins, temples, and tombs where powerful artifacts may be searched and discovered by your daring hero. Control of castles gives you income to raise armies, build fleets, and hire the occasional errant hero who may wander



into your domain.

The screen is divided into a strategic window that shows you an overview of the entire land, and a tactical window that gives you a detailed view of small areas. Armed units are represented by well-designed icons and up to to eight can be stacked in a single square. Combat can be intitiated during a movement when enemy forces occupy an adjacent square. The rather complex combat system is fully explained in the manual—it favors quality over quantity. The combat

Continued

display is neat—the icons of both sides face off and take shots at each other until one side is eliminated.

This bare description does not convey the truly addictive quality of the game. It is difficult to pull yourself away from the computer because you really want to see what the next turn will bring. The look and feel of the graphics are excellent, sound effects are used effectively, and the user interface is smooth and intuitive. The algorithms that drive your computer-controlled opponents make for a real challenge, with variables that allow many levels of difficulty, but it is possible to win a game without devoting months of your life to mastering it. Warlords is a model of how a computer war game should work—I only hope that SSG will apply some of the same ideas to "real" historical games, without the dragons, crypts, and wizards.

The package includes two 800K disks, a 48-page reference manual, and a colorful map. A third disk contains an elaborate HyperCard-based catalog of SSG's games.

The Macintosh version was programmed using MacApp, and the user interface is pure enough to please the most fanatical Mac cultist. The application size is 725K, with color resources adding another 662K and sound 108K. A saved game takes up only 52K. (Strategic Studies Group, 8348 Monticello Ave., Pensacola, FL 32514. 904/494-9373. Fax: 904/494-9374)

User Interface: 9
Graphics and Animation: 8
Sound: 8
Overall Play Value: 8

JACK NICKLAUS GOLF AND COURSE DESIGN "SIGNATURE EDITION"

Published By: Accolade
Designed By: Ned Martin
For: MS-DOS (640K RAM, 2.5MB of hard disk space, 256-color VGA or MCGA, 16MHz or faster CPU recommended, most audio cards supported)
List Price: $69.95

Golf has always been the favorite sport of the ruling class, it requires the conspicuous consumption of the ultimate resource: open space. A lot of top-quality development work goes into golf simulation for personal computers, since users interested in golf are likely to have upscale demographics and high-performance computer systems. Because golf lacks the visceral appeal of violence, and the kinetic thrill of fast action, a golf simulation needs beautiful landscape graphics and clever animation to engage the user. This new edition of Accolade's very successful Jack Nicklaus series justifies all that money MS-DOS users are spending on fast 386/486 CPUs, SuperVGA cards, and big hard drives.

The power bar that controls your swing has been

relocated horizontally, rather than vertically, to allow for a wider screen view of the fairway. The depth and richness of the simulation have also been enhanced. Fairways and greens have remarkable three-dimensionality. The effect of wind on the trajectory of the ball is modeled realistically. Bounces and rolls are simulated in a way that should satisfy the most demanding golf-loving physicists and engineers. The digitized sound of the swing even changes according to the club you select! A "tape measure" feature lets you determine the exact distance from the ball to any other object on the overhead view of a hole. Putting is still the most difficult part of the game

The program's twenty-one files occupy 1,689,769 bytes after installation, the executable for the basic game is a lean 86K. You have a choice of two simulated courses, English Turn Golf Club (New Orleans, LA) and Sherwood Country Club (Thousand Oaks, CA). The most impressive feature of the package, however, is the Course Designer, a separate application that allows you to design a

Continued

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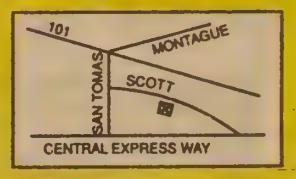

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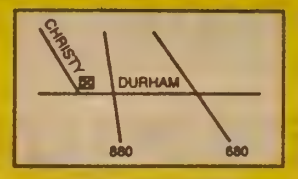

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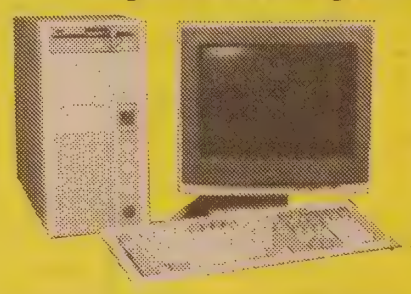

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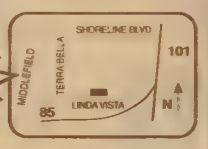

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single hole or an entire golf course, following procedures that model the process Jack Nicklaus actually uses to shape a raw plot of land into a championship golf course. A program map, organized like a flow chart, guides you through the steps. You can create landscape objects using a built-in paint program, or import any graphic in .LBM or .PCX format.

The handsome 124-page manual provides detailed instructions on how to design a course. The program uses a code wheel copy protection scheme.

Graphics and Animation: 9
Sound: 8
User Interface: 7
Overall Play Value: 9

UPDATE ON BLADE

Few things are perfect the first time out, and I was pleased to receive a "version 1.1 upgrade" to the game BLADE, published by Leviathan Corp. and reviewed here last month. BLADE is a visually and sonically stunning arcade-type game for the Macintosh that was, alas, virtually unplayable as it originally shipped.

One of the most serious problems with the original version was that it used the keyboard to control movement and slashing. On the Standard Apple Keyboard or Keyboard II, this problem was fatal because the hardware cannot "see" more than one keypress at a time (the Apple Extended Keyboard does not suffer from

this limitation). The first screen has been made much easier, and there are various bug fixes and animation performance improvements. The upgrade is installed by simply dragging a few files into the program's folder.

One of the fixes in the BLADE v1.1 upgrade is that you can now attack by pressing the mouse button. You can also adjust the speed of the game in a Preferences dialog box, and you can restart at the beginning of the level you were on when you were killed. Best of all, BLADE now supports the Gravis MouseStick, probably the most popular joystick used with Mac games.

The upgrade is available to registered owners of BLADE. (Leviathan Corp., 31201 Chicago Rd. S., Warren, MI 48093-5527. 313/826-3560)

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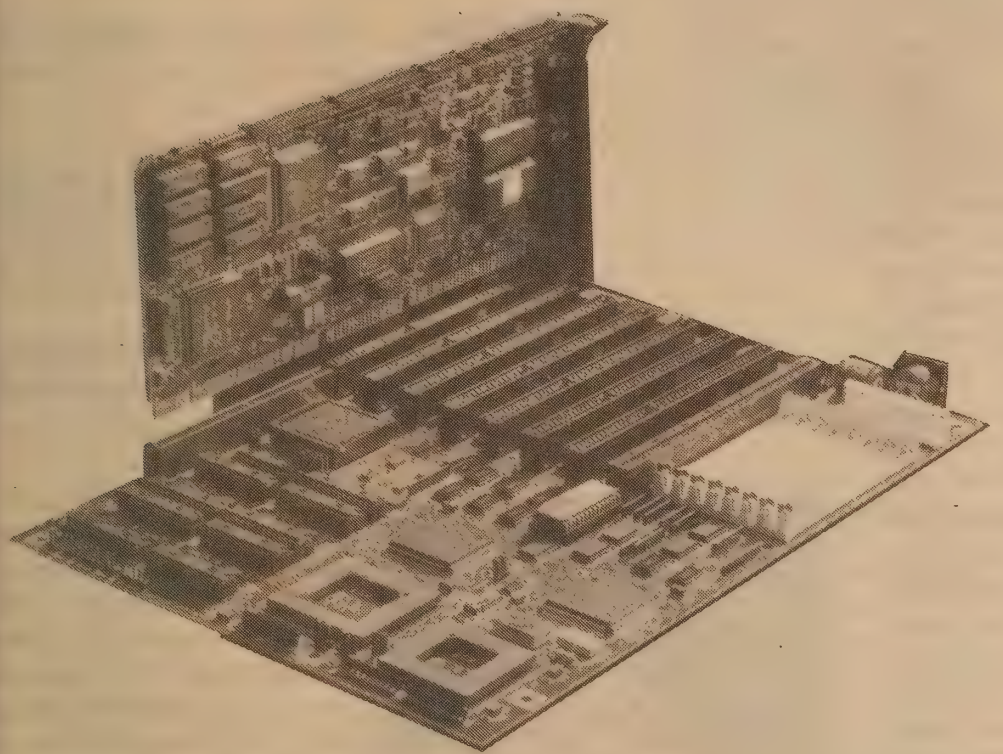

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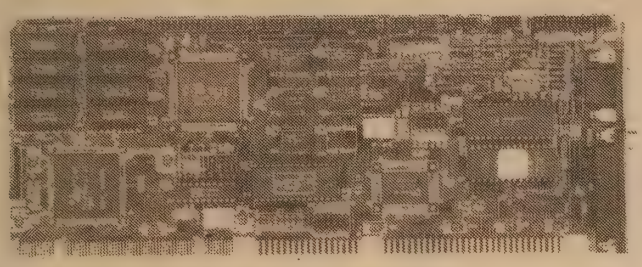

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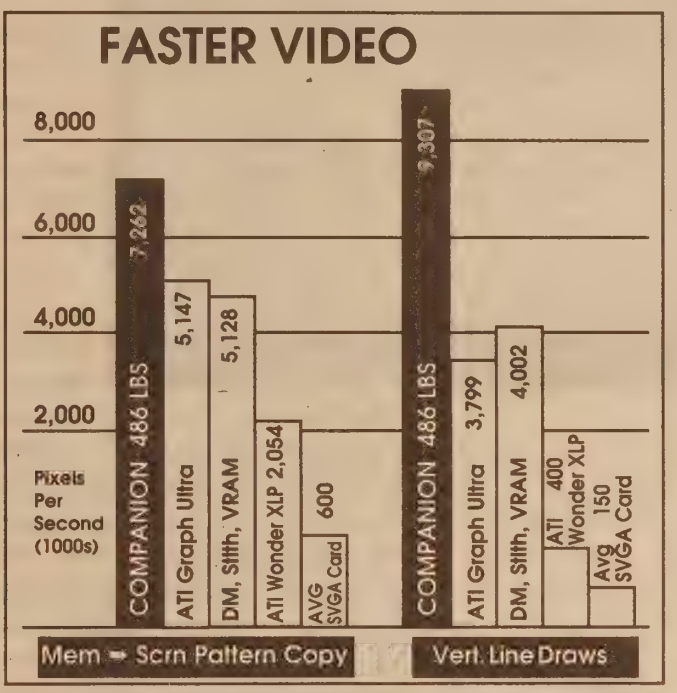

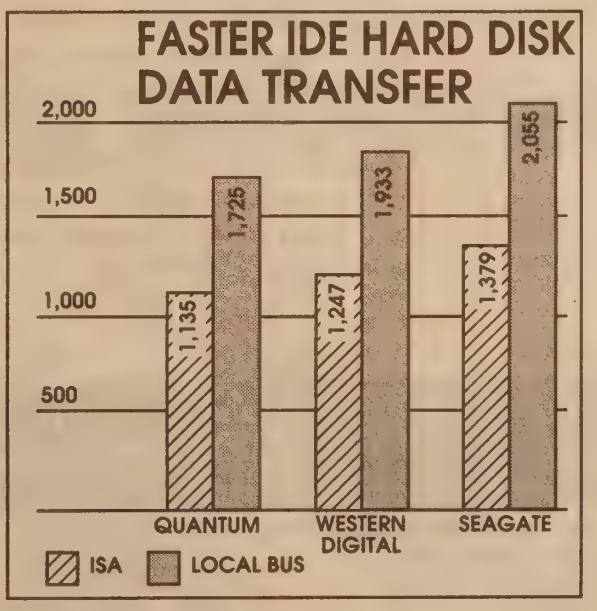

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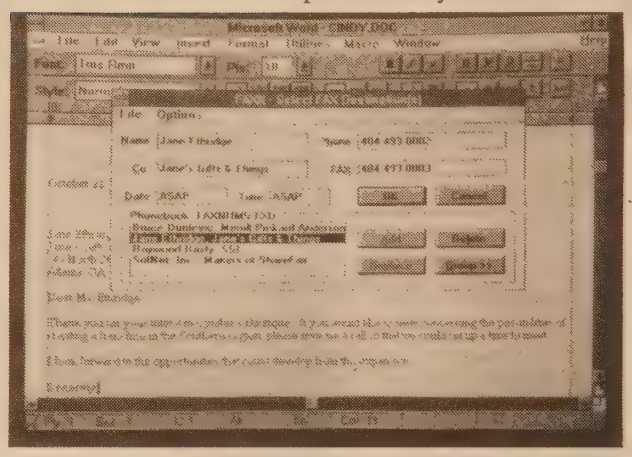
PC SOFTWARE REVIEW

FAXIT FOR WINDOWS

Published By: SofNet
List Price: $119.95
Reviewed By: Woody Liswood

FAXit for Windows, like its competition WinFax and WinFax Pro, provides high-quality print to fax service running under Microsoft Windows. It provides the ability to print directly from a Windows application through your fax board. Both FAXit and WinFax Pro work great. The major difference, and the reason for this article, is that FAXit works with a greater number of fax modems than does WinFax Pro.



FAXit requires a 35K TSR to be loaded before you run Windows. Since I rarely need to receive faxes while doing other work, I would like to have the option to install FAXit as a send only fax with any of the boards. This would preserve more of the low-end memory for use with applications.

During installation you can choose the modem, or modem type, from a variety of fax modems. FAXit also tests the modem connection, briefly, to insure that all is well, but will install even if there is no connection. With the World Port, FAXit told me I had an older version and instructed me to upgrade the ROM. I called the new owners of the World Port modem, US Robotics, and they sent the upgrade right away—at no charge unless I did not return the older EPROM.

The FAXit phone book works well, and unlike Winfax Pro, you can store numbers for a voice phone as well as a fax. And, as you might expect, you can group the entries, letting you broadcast the same fax to multiple locations with only a few mouse clicks.

From within the FAXit log section, you can view faxes which have been sent, resubmit failed faxes, and generally get the information you need about the faxes. After viewing a fax, you can save it in a variety of formats—TIFF, PCX, CAS—and print it as well.

Overall, FAXit is a competent program that supports a wide variety of fax boards—all of this is done in an easy to install, easy to use, and understandable manner. (SofNet, Inc., 380 Interstate N. Pkwy., Suite 150, Atlanta, GA 30339. 404/984-8088.)

WINSPEED

Published By: Panacea
List Price: $79
Reviewed By: Woody Liswood

Are you running Windows and concerned that it just does not have the speed and snap that you want? Other than upgrading to a 50MHz 486, WinSpeed may do the trick for you.

Panacea calls this a software-only display accelerator, I prefer to look at WinSpeed as a replacement display driver for your SuperVGA card. Whatever it is, it adds speed to your Windows display viewing.

You do, however, have to have the right equipment before you go out and get WinSpeed. You must have a SuperVGA display board that uses the ATI, Paradise, Trident, Tseng, V7, or Zymos chip set, you must have enough memory to display 256 colors, and you must be running Windows 3.0 or 3.1 (I don't think anybody uses Windows 2.0 anymore, do they?).

If you meet these requirements, Panacea says that you can get up to five times more display speed. I do not know about the five times, but I can tell you that you can physically feel and see the difference in how fast the display reacts.

Installation of WinSpeed changes your SYSTEM.INI and SETUP.INF files. But WinSpeed does save your old files so you can easily go back to your original setup.

If you really want to see Windows fly, and already have the necessary equipment, get WinSpeed, it works. (Panacea, Inc., Post Office Sq., Suite 4, 24 Orchard View Dr., Londonderry, NH 03053-3376. 1-800-729-7420)

WP2DOS PLUS

Published By: Club 100
List Price: $79.95
Reviewed By: Peter John Harrison

If you need a laptop for basic word processing or note taking, but you're on a budget, Tandy's WP-2 portable word processor is worth considering. Costing around $300 at Radio Shack, it's smaller, weighs less, and has a substantially longer battery life than any DOS notebook or laptop, though it sacrifices the disk drive and the display is only eight lines long. I use mine for all kinds of writing tasks, then upload my document files to a PC for

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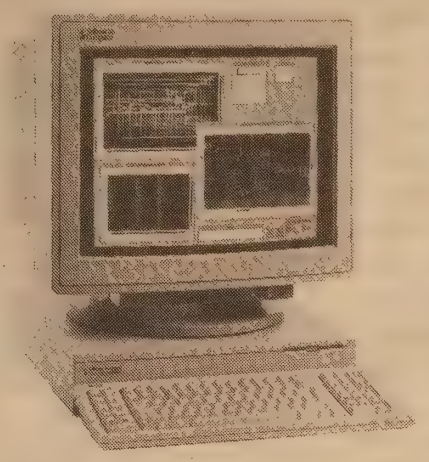

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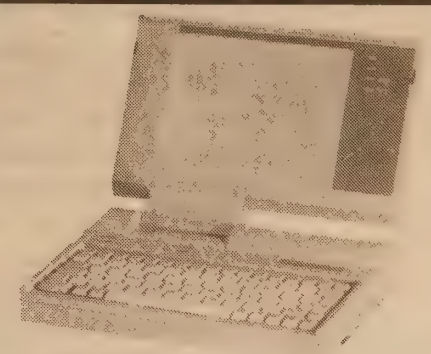

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386/25 MHz Non-Cache	375
386SX/25 MHz Non-Cache	330
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This Months Specials

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Mouse Plus Windows 3.1	48
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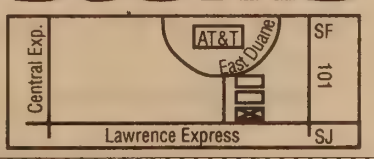

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PRODUCT SPOTLIGHT

final editing and printing.

To transfer my WP-2 files back and forth, I use a program called WP2DOS Plus, from Club 100. I could transfer files to my PC using the directions in the WP-2 manual, but the Tandy way is cumbersome, hard to follow, and doesn't preserve my document formatting. WP2DOS Plus does a much better job. By emulating the optional WP-2 floppy disk drive through my PC's serial port, WP2DOS Plus makes moving files between my PC and WP-2 as easy as entering WP-2 copy commands.

WP-2 files transferred to the PC are stored in the WP-2's native .DO format. WP2DOS Plus then provides file translation options for most major word processing packages, so WP-2 documents can be moved back and forth between WP-2 and desktop without sacrificing document format.

WP2DOS Plus's documentation is brief and reasonably complete, and the package includes the computer cable you need to connect your PC and WP-2. As for the software itself, it doesn't have pull-down menus or support a mouse for point-and-shoot file selection, but it's straightforward and easy to use.

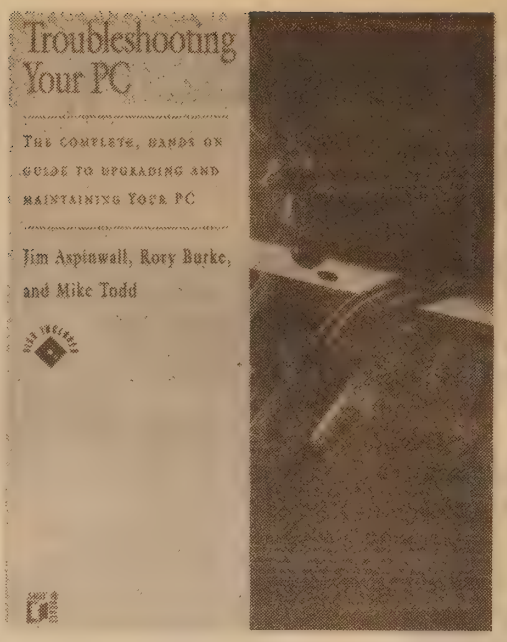
If moving files between my WP-2 and PC was a hassle, I wouldn't use my WP-2. With WP2DOS Plus, my WP-2 becomes an important part of my writer's tool kit. For people like me, who have both a PC and a WP-2, WP2DOS Plus is an absolute necessity. (Club 100, Inc., PO Box 23438, Pleasant Hill, CA 94523-0438. 510/932-8856. Fax: 510/937-5039)

BOOK REVIEW

TROUBLESHOOTING YOUR PC: THE COMPLETE, HANDS-ON GUIDE TO UPGRADING AND MAINTAINING YOUR PC

Written By: Jim Aspinwall, Rory Burke, and Mike Todd
Published By: M&T Publishing
List Price: $32.95 (with disk set)
Rewiewed By: Woody Liswood

If you are one of those people who needs to take the cover off a computer, *Troubleshooting Your PC* is the book for you. In close to five hundred pages, this guide touches upon almost anything you can think about in relationship to your computer. For instance, there were great discussions about memory conflicts which could help you if your SCSI port wants to share a DMA channel


Troubleshooting Your PC
The complete, hands on guide to upgrading and maintaining your PC
Jim Aspinwall, Rory Burke, and Mike Todd

or memory address with any of the other boards in your system. About the only thing I did not find was a section on CD-ROM drives and how to install them using a SCSI port.

There is one anomaly, though. On page 444, you are told that there is a companion disk for the book on a diskette inside the back cover. The last page of the book, however, is an order form to send away for the optional utilities disk for $15. Some copyediting needed here!

The book has an easy-to-read style with easy-to-find icons to identify different sections. You can quickly find any symptom simply by looking for its associated icon. If the symptom matches your problem, an "eye" icon identifies suspects, and a "light bulb" icon identifies possible solutions.

The excellent reference section by itself makes this book worth the cover price. This is another book which has a permanent spot in my library. (M&T Publishing, Inc., 411 Borel Ave., San Mateo, CA 94402-3522. 415/358-9500)

TELECOMMUNICATIONS HARDWARE

THE COMPLETE FAX/PORTABLE PLUS

Manufactured by: The Complete PC
List Price: $499
Reviewed By: Anna Couey

The Complete Fax/Portable Plus is a menu-driven, easy to use (if you remember to read the instructions) 2400 baud send/receive fax modem for PCs and compatibles. The portable CFax unit has two phone jacks, so you can attach it to an existing voice phone line and automatically receive whatever transmission comes your way. Its dimensions are a compact 6" x 3" x 1" and it weighs 6oz.

As a modem, I found CFax to be completely reliable (though I prefer Procomm to the BitCom package that came with the unit). It is configured to adjust to the protocol mode of the system you are connecting to—whether asynchronous, V.42, or MNP.

CFax includes quite a few nice fax features. You can broadcast faxes, as well as schedule your faxes to be sent at a particular time. You can convert a number of graphic file formats, including TIFF, from and to fax format; ASCII files can be converted to fax only. CFax also reads scanned documents, if you have a scanner. The CFax software gives you the option of customizing a fax coversheet,

complete with logo, to accompany your faxes. CFax also lets you maintain a fax directory. The unit can send and receive faxes in either standard resolution (204 x 98) or fine resolution (204 x 196). And, you can receive faxes while you are using other applications.

The criticisms I have are relatively minor annoyances. One is, if you have a multiple-page fax document, you have to select each page to be transmitted. If you simply select the fax from a list of available faxes to send, only the first page gets transmitted. I sent several fax fragments before I realized what I was doing. Another criticism is that the CFax software doesn't tell you whether your fax has been transmitted successfully, it just sends it and hangs up. Personally, I like confirmation.

The Complete Fax/Portable Plus does everything it claims, and it does it very well. Rarely completely satisfied, I'm waiting for the day when I can easily receive a fax, convert it to ASCII, and send it back out on the nets! (The Complete PC, 1983 Concourse Dr., San Jose, CA 95131-9841. 408/434-0145. Fax: 408/434-1048.) ■

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MISCELLANEOUS

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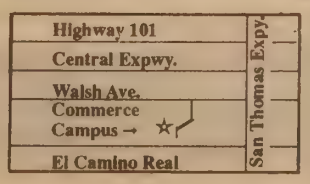

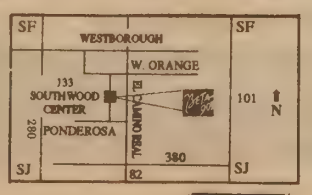

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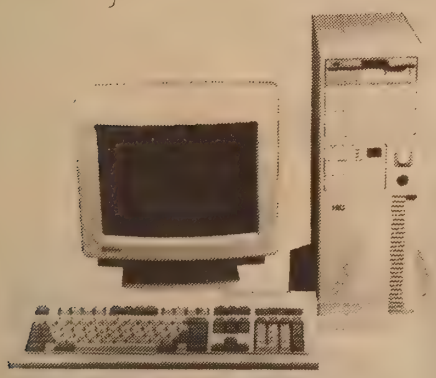

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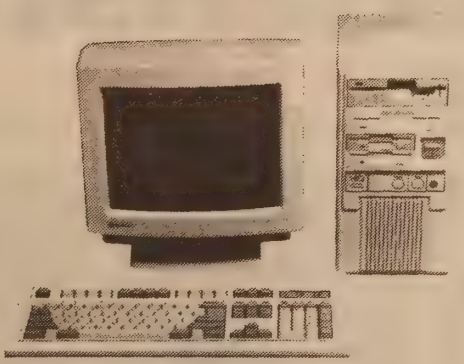

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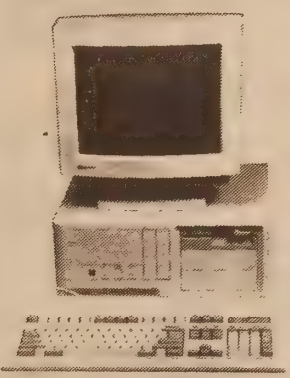

HIQ 386/25DX $1255
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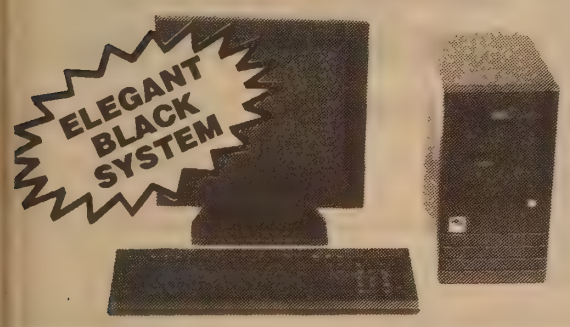

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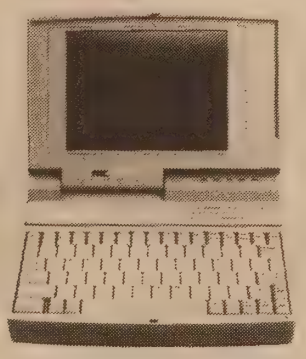

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PC MAGAZINE

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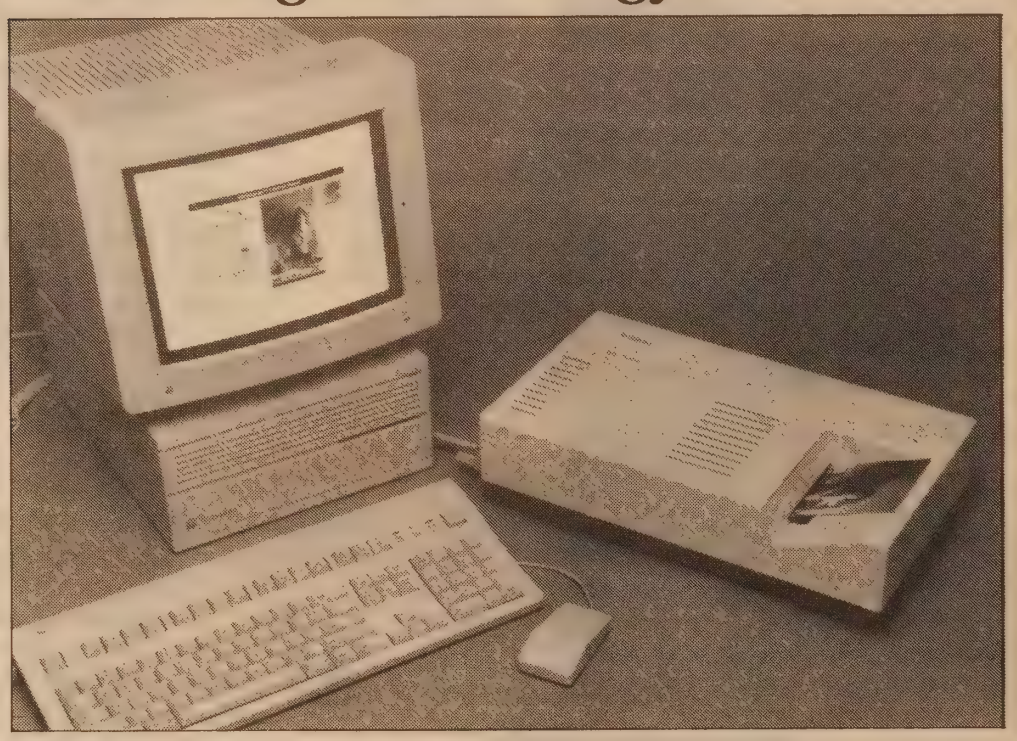
Virtual Naturalism

New Image Technology From Polaroid

BY TONY REVEAUX



The Polaroid CS-500 brings easy, high-resolution image scanning to the Mac.

Both Kodak's Photo CD system and the Polaroid system make high-resolution digital color images easy and affordable. One is built for durability, the other for speed.

Virtual reality is beginning to reach the personal computer, one finger at a time, as supporting technologies are evolving to become more efficient and affordable. Those same improvements and enhancements have been raising the level of more realistically "natural" characteristics at the desktop.

Speech is one capability that's long overdue. Natural-sounding synthesized voice is coming closer now with the Sound Bytes Developer's Kit from Emerson & Stern Associates Inc. While it still sounds a bit robotic, it allows Macintosh developers to incorporate more human-sounding speech modes into applications.

In computer graphics, screen images are beginning to look less "electronic" and are displaying more of the range of subtleties served by traditional media. Fractal Design Corporation's Fractal Painter program provides a full palette of realistic textures that show the responsive "feel" of brushed oil, pastel, chalk, crayon, and a variety of papers.

Light Source's Ofoto is able to interpolate scanned images from photographs and deliver black-and-white hardcopy prints that have the credibly smooth tonal ranges that we associate with photographic prints. Ofoto introduces a basic user level that offers point-and-shoot simplicity, eliminating the need of the trial-and-error process of multiple passes.

Now, right on the heels of Kodak's new Photo CD, Polaroid has introduced its Digital Photo Scanner system. Now we have several high-resolution imaging choices at the desktop that might be called "virtual naturalism."

POLAROID'S DIGITAL PHOTO SCANNER

Long known for "instant" color photos, Polaroid has introduced an equally quick turnaround from paper print to high-resolution digital image on the screen of a Macintosh or PC.

For some time, Polaroid has been introducing a suite of desktop digital imaging peripherals—the Polaroid Digital Palette Film Recorders, the Polaroid Digital PhotoPrinter, the Polaroid Thermal Printer, and now the Polaroid CS-500 Digital Photo Scanner ($4495 bundled with Adobe Photoshop, $3995 without). Of these units, the new Scanner is perhaps the most interesting in terms of applications for desktop publishing and multimedia.

The CS-500 is limited in terms of its 4" x 6" maximum document input. Polaroid's market research has determined that that standard color print size is by far the most widely used of the billions of prints produced worldwide every year. Despite this limitation, the CS-500's speed and the quality of its image capture and display set it apart from other products.

The maxim of a captured image being only as good as the original

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Tony Reveaux, a San Francisco-based consultant, is the editor of Computer Publicity News *and a contributing editor for* Artweek, *and writes the "MediaScan" column in* Film/Tape World. *He can be reached via Internet (luna@well.sf.ca.us) or MCIMail 290-3008.*

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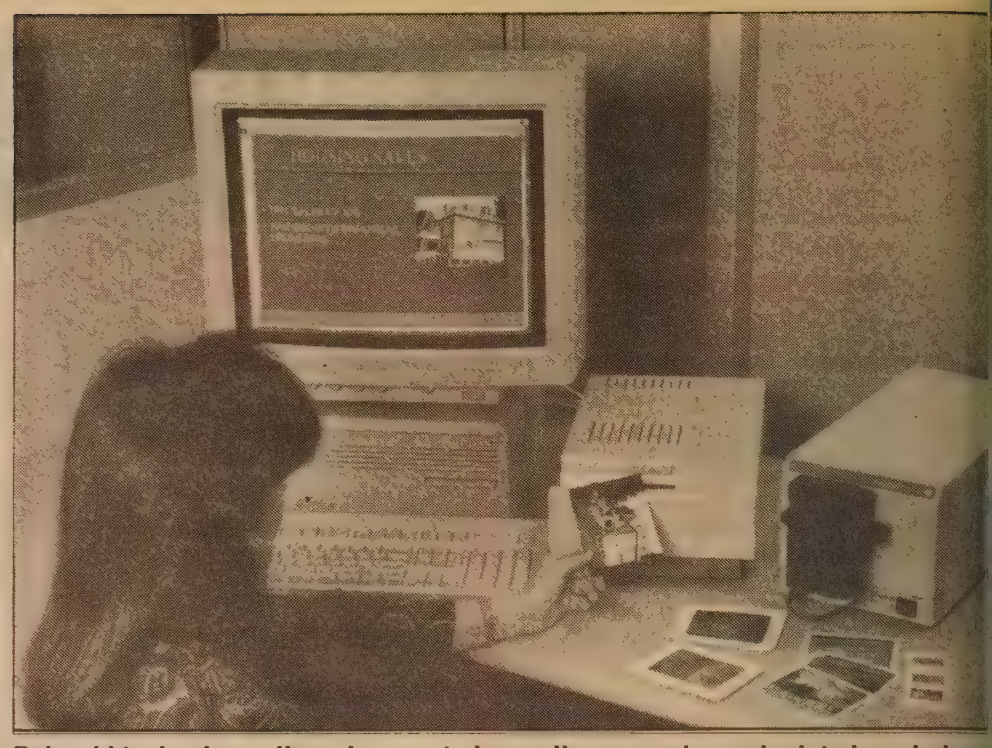

Polaroid technology allows images to be easily scanned, manipulated, and place in documents.

does not always apply in the digital realm, where enhancements can often improve a document over the original. With Polaroid's specially designed CCD sensor, the CS-500 can make a 24-bit, 125dpi scan of a 4" x 6" photo in three seconds, or 500dpi in twelve seconds. The quality of the screen image is rich and detailed, and to the average eye, completely photorealistically natural.

Product intro demonstrations reveal a lot about a company's confidence in its technology. For instance, when I saw one of Sony's early demonstrations of the HDTV camera and display system, the scene on the ultrawide monitor played it safe—just a grassy meadow, no major color contrasts, little motion, and zero people. Polaroid took the high ground with its demo, one of the most challenging subjects for any photographers worth their light meter. Three children—an Asian, a Caucasian, and an African American—in the same close shot. The results on the screen of the Mac after the scan showed a level of warm naturalism bordering on perceptual transparency—you're more aware of the subject than of the medium.

The key to the scanner's stunning performance with color photos is the CCD (Charge-Coupled Device) sensor and a custom ASIC (Application Specific Integrated Circuit) designed and prepared by Polaroid. Both Kodak and Polaroid are corporations that are almost "Japanese" in terms of deep investments in R&D and their commitment to long-range planning. Here, Polaroid's years of research in the nature of light and reflection have paid off.

The CS-500 will also do 8-bit grayscale, and resolutions of 500, 250, or 125dpi (dots per inch). The device comes with the appropriate software for the user's computer. For the Mac II, Polaroid SprintScan has preview mode, cropping, and realtime color image processing. An Adobe Photoshop plug-in is included, and SprintScan translates to TIFF, PICT, and RGB file formats. The CS-500i will be the next scanner model to be released. It will be compatible with both the Mac II and Windows/386SX machines.

POLAROID VS. KODAK

Should you get a Polaroid CS-500 instead of a 24-bit color flatbed scanner, or wait for Photo CDs?

The CS-500 is designed for a specific purpose, which it does very well. The SprintScan software allows for wide latitude in selecting and adjusting color values and levels, but—as with Light Source's Ofoto—most of the scans get it right the first time from most original photos.

In using a top-of-the-line 24-bit color desktop scanner like the Microtek ScanMaker 600ZS, I've found that with a great deal of tweaking you can get good screen results from a color print. Color matching devices such as those made by RasterOps and SuperMac, and Savitar's software-based matcher can help to match screen display to output device, but it's going to be hard to beat the specific engineering built into the CS-500 for that first scan.

If you draw your scans from a variety of original materials, however, the CS-500 can behave like a brick wall. Anything that will enter the 4" x 6" hopper and fit between the rollers will be scanned—if it fits. It's true that most hand-scanner scans are drawn from areas that size or smaller, but the subjects are usually scanned from books, catalogs, maps, and magazines, rather than conveniently trimmed rectangles.

The Polaroid CS-500 will be especially useful for volume work such as in publishing, corporate communications, medicine, science, advertising, real estate, insurance, presentations, and image databases. Service bureaus should have them available soon, so even if you have varied workload demands a good quality flatbed, you may run jobs or batches of snapshots through at a laser parlor.

Both Kodak's Photo CD system and the Polaroid system make high-resolution digital color images easy and affordable. One is built for durability, the other for speed. With the Photo CD, you may have to wait three days, but you end up with the images on a permanent optical storage medium with built-in multimedia capabilities. Nothing could be faster than the Polaroid: shoot the subject with one of their instant cameras, wait the minute or so for the print to "cook," slide it into the CS-500, and the image is on the screen, self-corrected and ready to drop into that deadline edition within a few minutes.

What's common to both Kodak and Polaroid is that, with the world's best state-of-the-art image digitizing technologies, their screen pictures depend upon mechanical cameras using silver-halide film. Both industrial giants have independently come to the same conclusion—that affordable, consumer-level high-resolution digital cameras are decades away. So for both, the field image capture device remains the hand-held 35mm or PolaChrome CS camera.

For us desktop producers, these tools offer many more options for including realistic photo images in any kind of work we do, and we will see much synergy between the Kodak and Polaroid systems mediated by the personal computer.

"PHOTOSCRIPT"

With Light Source's Ofoto for monochrome and Kodak's Photo CD and Polaroid's Digital Photo Scanner for color, the fully photorealistic image document, once found mostly in the graphics workstation environment, is now accessible at the average desktop. It may be seen as analogous to the introduction of PostScript for desktop publishing.

But there is not yet an analogous "PhotoScript"—a consistent file format that is generated at the device of origin. Each manufacturer generates documents in its own way, and one that can be easily translated for the Mac or PC desktop. What is consistent is the familiar, directly readable, "*National Geographic*-type" quality color photo.

Again, it should be emphasized that professionals using video capture boards, 24-bit color scanners, and other high-quality imaging products have already been achieving these levels of images at the desktop; the difference is that non-professionals can now enjoy a level of quality and consistency that has hitherto been elusive. No more "glass ceiling" for naturalistic photorealism. ■

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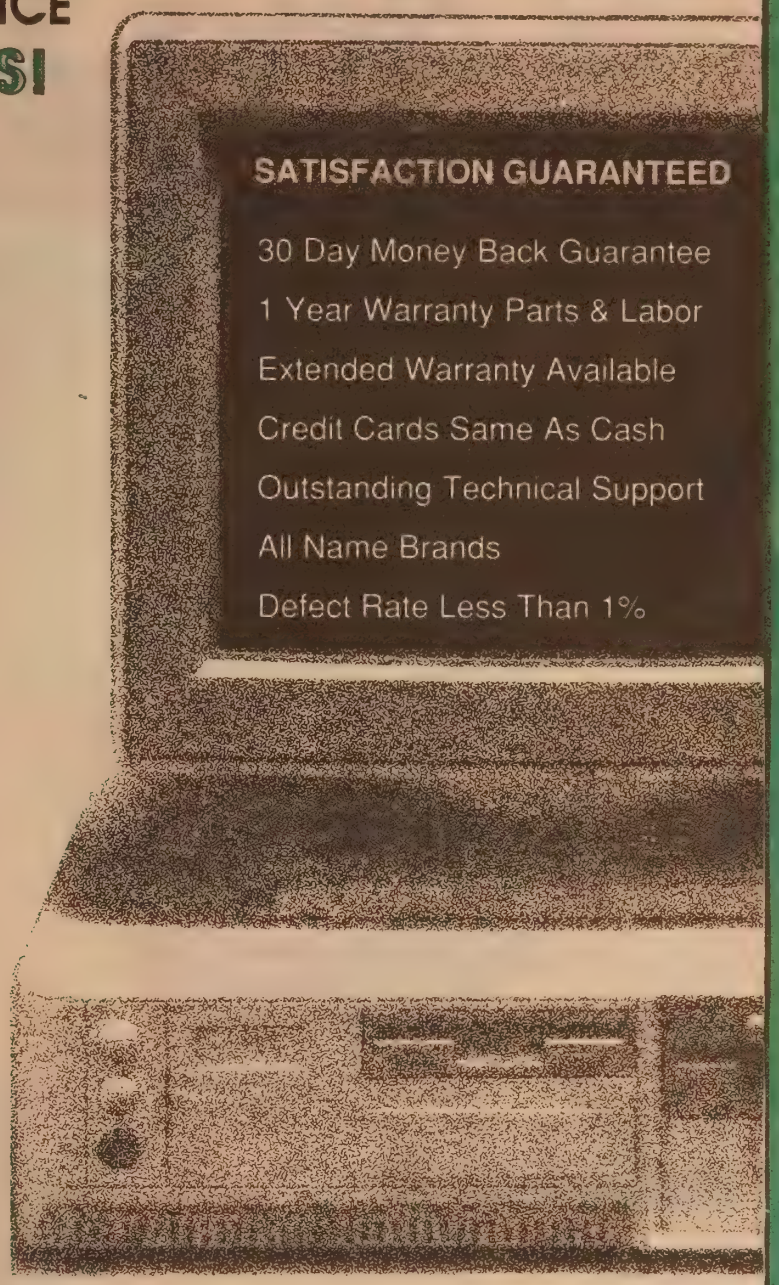

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News, Tips, And Trivia

BY DAVID MORGENSTERN

Hold on to your hat this month. There's news, tips, and trivia. Some consider these all different flavors of the same dish, but BMUGers can sort them out in quick time. News is fresh tips, while trivia is vintage news.

VIRUS R US

It's getting to be an unfortunate ritual in the BMUG office—the discovery of a new virus! The latest offering is an annoying piece of work called CODE 252.

CODE 252 is designed to trigger if an infected application is run, or system booted, between June 6 and December 31. When triggered, the virus brings up a dialog box with the message:

You have a virus.
Ha Ha Ha Ha Ha Ha Ha
Now erasing all disks...
Ha Ha Ha Ha Ha Ha Ha
P.S. Have a nice day.
Ha Ha Ha Ha Ha Ha Ha
(Click to continue...)

Despite this message, no files or directories are deleted, but a worried user might power-down the system on seeing the message. This action may corrupt the disk, leading to significant damage.

BMUG

Under System 7, the System file can be seriously damaged by CODE 252 as the virus attempts to spread. This can lead to a system that refuses to boot, crashes, or exhibits other unusual behaviors. Of course, this mimics the usual behavior of some applications running in low-memory situations under System 7, so take your pick.

Between January 1 and June 5, the virus spreads from applications to system files, and then to other application files. Although most applications will not be affected by actions of the virus spreading, some applications have specific code to fight virus attacks. They may not work, or will warn you that they've been infected.

The version of Disinfectant that was written especially to treat this virus is v2.8. The latest version of Disinfectant can always be found on the BMUG Utilities V1 disk available from the BMUG office.

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TUNEUPS AND DOWNS

Last month I explained in great detail the problem of the Great System 7 Desktop Bug. Apple bug fixers must have been working overtime, because they came up with a fix. Sort of.

Last January, Apple sent out a set of updated system parts, called Tune-Up 1.0. It fixed some of the printer drivers and supposedly speeded some things up. In late March, the Cupertino systemware gurus released an update, Tune-Up 1.1. The street name for the update is the Tuner.

Tuner has a patch that will prevent you from catching the Desktop bug, but it can't fix your drive if you already have a corrupted system. Before you load the new extensions, you're supposed to run the Disk First Aid program and check your drive for the problem. If everything checks out fine, you immediately install the Tuner on the hard disk.

Tune-Up 1.1 modifies the System file by adding some INIT resources. These are inserted the first time you boot up running the Tuner extension. There is a block of ASCII text at the end of one of the resources which reads "Tuna Helper."

Once you've run Tune-Up, the fix code will always be there, even if you later turn off the Tuner extension by holding down the Shift key as you start up.

There's a trick with the Tune-Up updates. All you have to do is drop the Tune-Up Parts folder on your System folder. A dialog tells you that "these items need to be stored in special places in order to be available to the Macintosh." A very smart system folder. There's an Installer script included with the Tuner, because Apple user testing discovered that 40% of people couldn't get it right without the Installer. Read the instructions? Who, me?

Everything would have been the cat's pajamas, except that there were serious problems with Tune-Up 1.1. The program was compiled with the wrong version of a header file, causing the "Application Assassin" to crash. This is the code that brings up a dialog suggesting one application to Quit, allowing another application to run in low-memory situations.

There are three memory numbers stored for every application: current, suggested, and minimum, which is invisible. The first two numbers are found in the Get Info box for the application. The third may be the same as the suggested amount, or it may be lower. With Tune-Up running, as long as there is more memory available than the minimum, you will not get a low-memory warning message.

Under System 7, the System file can be seriously damaged by CODE 252 as the virus attempts to spread. This can lead to a system that refuses to boot, crashes, or exhibits other unusual behaviors. Of course, this mimics the usual behavior of some applications running in low-memory situations under System 7, so take your pick.

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The application will open, even though a further mouse-click may be too much for it to handle.

For example Excel 3.0 has a suggested 1,536K allocation, but a minimum of only 512K! As long as there's 512K available, Excel will launch, with Tune-Up. You may have only enough memory available to calculate Bill Gates' personal wealth on the day's stock market result—but the program will open.

Computer manufacturers have always had difficulty understanding the difference between *opening* programs and *using* them. We hear that a certain underpowered hardware configuration can "run" System 7 or other fancy applications. This is all marketing hype. Real-world use (the kind we specialize in at BMUG) always gives different results. You may be able to run, but not use the software.

I'm really bugged by the removal of the dialog, even if a study showed that the quit-to-free-up-memory dialog confused more users than it helped. It really acted as an early warning of a potential low-memory difficulty. Users move quickly back and forth between programs, performing related tasks. Without the early warning this might turn out to be a bad move, since not all applications handle low-memory gracefully. A word to the wise: Always remember to save your work before opening another application or desk accessory.

The faulty Tuner release also points out flaws with Apple testing. I've often felt that everyone at Apple appears to be flush with memory. If the Tuner was being pounded on machines with 2.5 to 4MB of RAM, wouldn't they have uncovered the bug?

The corrected Tuner release is v1.1.1 and is available from the BMUG office.

THAT TINGLING FEELING

Have you been spending a little too much time at the computer? I know that sometimes I feel a bit of Carpal Tetris Syndrome starting to nibble at my hands. Al and Tana Brinnand of MouseMitt International have done something about it.

They've created a padded Lycra mini-glove called the MouseMitt Computer Glove and a bigger cousin, the MouseMitt Keyboarder. They remind you to keep your wrists up in the proper ergonomic position. MouseMitts keep your wrists warm, but not hot and sweaty. It's the same concept as leg warmers in exercise class. There's some cushioning on the underside of the glove.

These gloves are not therapeutic devices, but are preventive measures to keep you out of the doctor's office. I like the extra-padded Keyboarders, since I have very lazy wrists. The MouseMitt lists for $10.95 each and the Keyboarders are $25 a set. You can reach them at (408)335-9599 or fax (408)335-9598.

What Is BMUG?

BMUG is an educational, nonprofit, consumer advocacy group organized to share information and provide critical direction to users and developers in the computer community worldwide. It is an independent advocate, not affiliated with any manufacturer, delivering trustworthy information and useful products.

Like any growing organization, it is many different things to its thirteen thousand international members. BMUG supports many Special Interest Groups (SIGs), a Bulletin Board System (BBS), free HelpLine, software library, weekly meetings, publications, and much more. BMUG also puts out a semiannual 400+ page book that we call our "newsletter."

Our motto continues to be: *We're in the business of giving away information.*

Come and join in the dialogue at the BMUG main meeting every Thursday evening, 6–9 pm (or whenever we finish), in the Physical Sciences Lecture Hall on the UC campus. BMUG West is a meeting held monthly in the Exploratorium, San Francisco's science museum.

The BMUG Office, 2055 Center St. (a half block from the BART station), is open to the public 9 am to 5 pm. Please come by and say hello, meet other members, and hang out.

The BMUG HelpLine, (510)540-1742, and our fax number, (510)849-9026, provide technical assistance and telephonic hand-holding during business hours (11 am–5 pm). If your question can't be answered on the spot, we try to get you in touch with someone who can help. Of course, not every problem can have a happy ending—but we try.

BMUG has one of the most up-to-date, comprehensive software libraries around with hundreds of disks filled with the latest versions of public domain or shareware programs and HyperCard stacks. New disks are unveiled almost every week at the Thursday general meeting. BMUG also brings you the *TV-ROM*™, a fantastic collection of public domain QuickTime videos.

Our sixteen-line BBS offers many of the latest versions of files in our software library as well as news, private mail, rumors, etc. The BMUG BBS is part of the worldwide EchoMac Network on FIDOnet (161/444); by calling a local FIDOnet BBS in your area, you would then be able to get in touch with us wherever you were, as well as send mail to users everywhere! With our multiline capability, you can have access to BMUG almost twenty-four hours a day. It's easy to use, fun, and a great resource.

BMUG can be found on most electronic services. BMUG can also be reached through the international USENET network through bmug@garnet.berkeley.edu.

To get some further information about BMUG please write to: BMUG, 1442A Walnut St., #62, Berkeley, CA 94709. If you prefer to phone our business office call (510)549-BMUG, or fax (510)849-9026.

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TRIVIALIZATION PROCLAMATION

Here we go again—the Second Annual MacTrivia Test (Part One). Amaze your friends, coworkers, parents, and even yourself! And if you can't answer a single question, please don't let it injure your self-esteem. It's not an I.Q. test, and is purposely skewed to favor the hard-core Macintosh nut. This is unfortunately only the trivial tip of the iceberg, and there will be lots more next month.

ANCIENT-ISH HISTORY

1)The original 128K Macintosh came with an audio tape, *Guided Tour of the Macintosh*. Who provided the musical interludes for the cassette?

2)Apple decided on a one-button mouse because:

a)it made the system easy to use for a novice.

b)it made the documentation easier to write.

c)the designers needed new eyeglass prescriptions and thought there really were two buttons on the mouse.

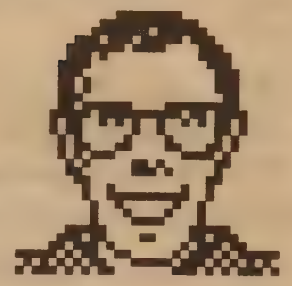
3)Which of the following was a source of pride to members of the Macintosh design team as reported in the first issue of *MacUser* magazine, October 1985?

a)Granola and alfalfa sprouts were still offered in the Apple cafeteria even though Steve Jobs was no longer with the company.

b)Some brave programmers were using the Mac to write Macintosh programs.

c)People were buying the 512K Macintosh, even though it was called "Fat."

4) Who is this?



5) Here is a column of Macintosh products and products-to-be. Match them with their code-names.

32-bit QuickDraw	Holy Hand Grenade
AppleScript	Casper
QuickTime	Project Warhol
AppleShare 3.0	Jackson Pollack
HyperCard 1.0	Newton
AppleTalk Remote Access	Cheez Whiz
Speech Recognition	WildCard
Pen-Based Computer	976

ANSWERS—NO CHEATING!

1)The tinkling piano music was from George Winston of Windham Hill Records. The Tour cassette also betrays an unfortunate early form of Mac-speak. It says that "This is the guided tour of Macintosh." Not "Macintosh computer," or "the Macintosh." Just Macintosh—lifestyle,

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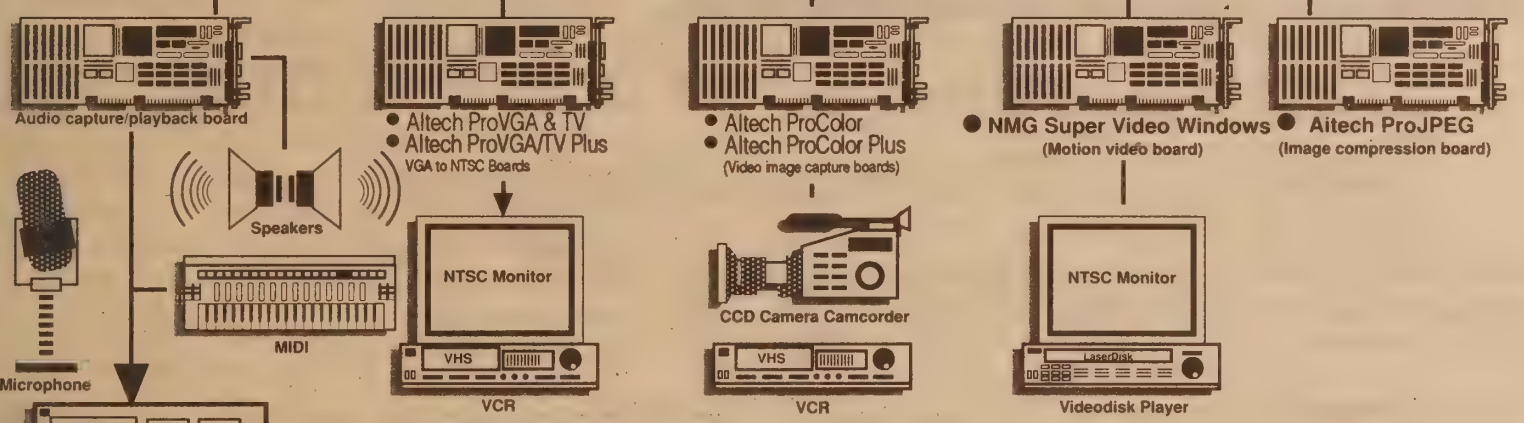

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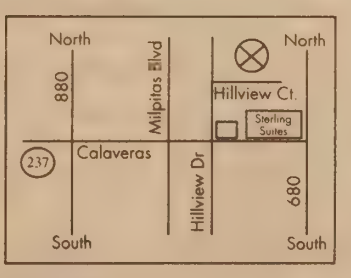

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religion, and toaster.

2) b) Jef Raskin, the original head of the Macintosh project, says categorically that making the mouse easier for new users was not the reason. He had observed at PARC that he and other "expert" users often made mouse button errors. When he designed the Macintosh interface at Apple, he listed the tasks mice had to perform, and found paradigms that would work with one, two—and zero—buttons!

"The button" was clearly the simplest and just happened to be easier to teach (and write documentation for). He said that his original design did not require double-clicks and that "feature" was added later, after he left Apple.

Jef said, "What I was blind to was the still better idea of labeling the mouse buttons. All mice at the time had unlabeled buttons, and I unthinkingly followed the trend."

The concept of different sizes and shapes of buttons has only recently become popular. The new chording keyboards, like the BAT keyboard (as seen on the latest BMUG Macworld Tour video), have a few differently shaped buttons which help give the user touch-based clues to avoid errors.

3) b) When the Macintosh first hit the streets, if you wanted to use a Mac to create programs for itself, you were out of luck. There was no Mac-based Macintosh programming language—it was all done on the Lisa, or on larger computers, and then ported over to the Mac. A year and a half later there were plenty of choices, helped out by the emergence of expensive memory upgrades and hard disk drives.

4) You might not recognize him in his icon form. It's Bill Atkinson, genius programmer, former Apple Fellow, and creator of QuickDraw, MacPaint, and HyperCard. He's down at General Magic, hopefully helping to make the next wave of personal computing devices.

5) 32-bit QuickDraw=Jackson Pollack, AppleScript=Cheez Whiz (unreleased), QuickTime=Project Warhol (an early version of the extension had the icon of a Campbell's soup can), AppleShare 3.0=Holy Hand Grenade (The System 7 File Sharing Extension's creator is "hhgg." Some think this is a continued reference to the Monty Python Holy Grail movie, where it was called the Holy Hand Grenade of Antioch. But others think it's the initials of the Hitchhiker's Guide to the Galaxy. Whichever you're a fan of can be your choice.), HyperCard 1.0=WildCard (the creator of a stack is "wild"), AppleTalk Remote Access=976 (that's the US phone-sex area code), Speech Recognition=Casper (unreleased), Pen-Based Computer=Newton (just-announced product). ■

UPCOMING EVENTS:

May 7	Acius 4D-Server, T/Maker WriteNow 3.0.
May 14	Finals. Sorry, No Meeting!
May 21	Finals. Sorry, No Meeting!
May 25	Memorial Day. Sorry, No BMUG West.
May 28	Aladdin StuffIt Deluxe and SpaceSaver, Casady & Greene Glider.
June 4	Globus Software Security Force.

Call Betsy Kennedy at the BMUG office about our new Windows Special Interest Group and Windows Newsletter! The BMUG Announcement Line has the latest information on BMUG activities. (510)849-9114.

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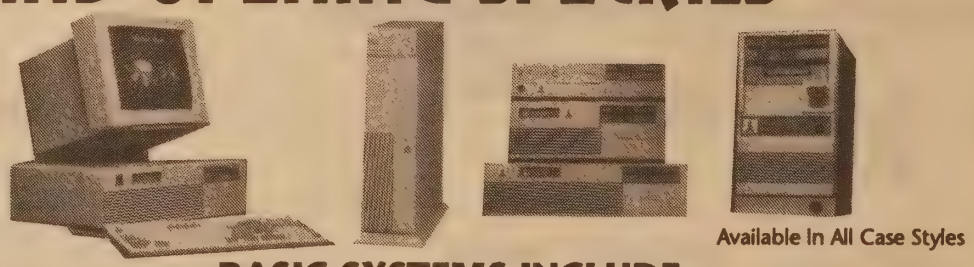

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Multimedia Tools And Toys

Paint, Animation, Video, And More

BY MATTHEW LEEDS

AMIGA

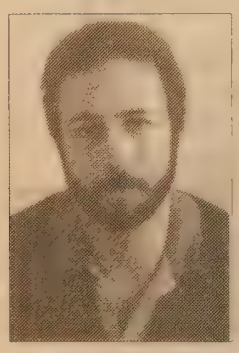
It's been out for a while, but this is the first chance I've had to mention Deluxe Paint 4 from Electronic Arts.

DPaint set the standard for the user interface of paint programs on the Amiga, and DPaint 3 brought a new level of animation to the genre. DPaint 4 now supports HAM, and a new color mixer has been added, so you can now interactively mix colors and create new ones. You can also save and load customized palettes and color sets as independent files.

Five different kinds of adjustable gradients are available. A paint stencil mode allows you to mask an area to protect the original design and colors while painting over it. A new antialias setting allows you to smooth out the edges of your design, eliminating the stair-step effect.

Animation is easier and more powerful with the new version. An on-screen, VCR-like control panel gives you more fluid and interactive control of your animations. The LightTable lets you display multiple frames under the current frame, so you can use a "key-frame" as a template, and easily paint in-between frames for an animation. Another feature, Metamorphosis, transforms two custom brushes into an AnimBrush over a designated number of frames, enabling you to transform, for example, an egg into a chicken.

DPaint 4 and AdPro 2.1 (see last month's column) both offer color pickers with a 256-color range. While the Amiga currently does not support 256 colors in any mode but HAM, the inclusion of color selection tools designed to support 256 colors suggests that these developers may know something about possible new features in a hypothetical new Amiga model.



Copyright© 1992. All rights reserved. *Matthew Leeds has been involved in the high-tech field since he blew up his bedroom playing with a children's chemistry kit. He has been using Commodore computers since 1982 and has a strong interest in photography, video, graphics, and related fields.*

NEW FROM MICROILLUSIONS

MicroIllusions shipped Genesis The Third Day, a fractal landscape generator. This program lets you create landscapes of real locations, using authentic government data, or imaginary locations by using an easy-to-use interface. You control the fractal dimensions, roughness, height, river networks, lakes, sea level, contour heights, shading, position of the sun, and more. You can set the observer viewpoint anywhere in the 3-D space around the landscape, and the camera has an adjustable focal length.

There are five drawing modes; and the colors are adjustable for each landscape element, even after the picture is drawn. Object files for most popular 3-D modeling and animation programs can be generated, and pictures can be saved as IFF images in low or high res, as HAM or as 24-bit files. Genesis also supports AREXX.

MORE CDTV TITLES

For those few of you who own a CDTV, or for those of you looking for a reason to buy a CDTV other than the small selection of software currently available for it, check out the growing library of CD+G and CD+MIDI discs from Warner New Media.

CD+G discs have graphics data encoded in special subcode channels on the disc, and these graphics can be displayed by the CDTV (or on an NEC TurboGrafx Game Machine). CD+MIDI discs have MIDI data in the subcode channels. If you've got a MIDI-capable synth or keyboard, you connect it to your CDTV and get additional music.

The "Presenting CD+MIDI Featuring Music from George Gershwin's Rapsody in Blue Performed by the Hambro Quartet" disc has both MIDI and +G subcode data. When it's connected to a MIDI device, you can listen to the performance as a solo, as a four-piano piece, or as a full orchestral performance. The +G graphics explain what is going on, as does a voice narration. The performance is also on the disc as standard CD-Audio.

If you're interested in other CD+G discs, here's a partial list of titles from Warner New Media:

Laura Branigan - *Laura Branigan* - **Atlantic 82086**

Ella Fitzgerald - *Ella/Things Ain't What They Used to Be* - **Sire 26023**

Flamin' Groovies - *Groovies' Greatest Grooves* - **Sire 25948**

Fleetwood Mac - *Behind the Mask* - **Warner Bros. 26111**

Emmylou Harris - *Pieces of the Sky* - **Reprise**

CD+G discs have graphics data encoded in special subcode channels on the disc. The graphics can be displayed by the CDTV. CD+MIDI discs have MIDI data in the subcode channels. If you've got a MIDI-capable synth or keyboard, you connect it to your CDTV and get additional music.

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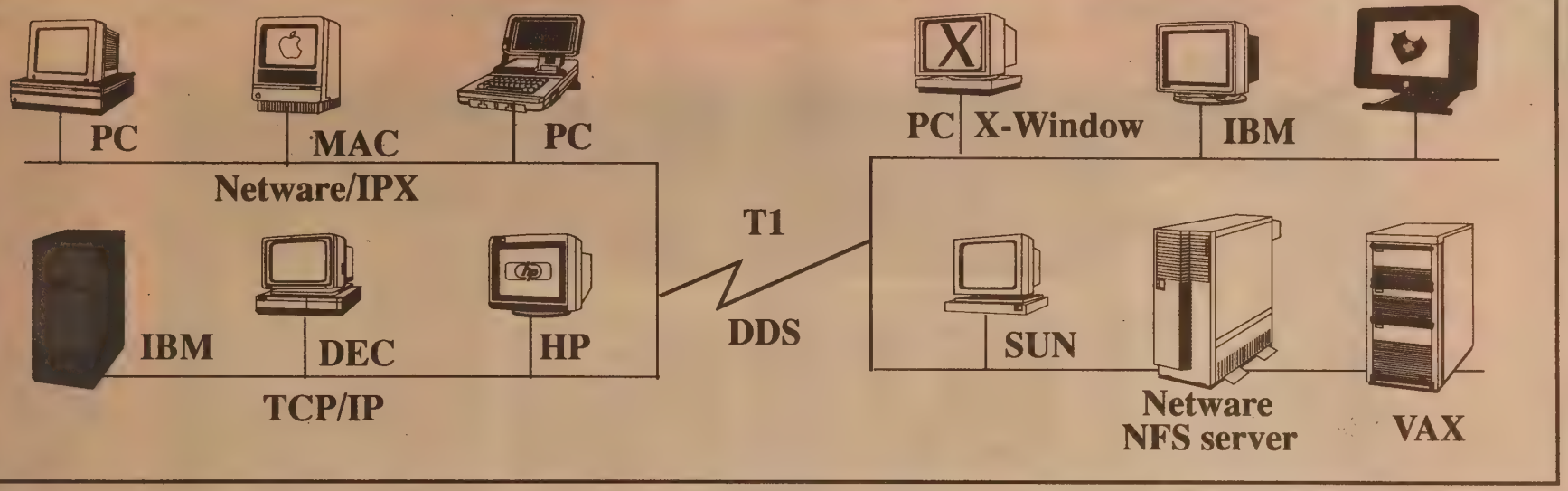

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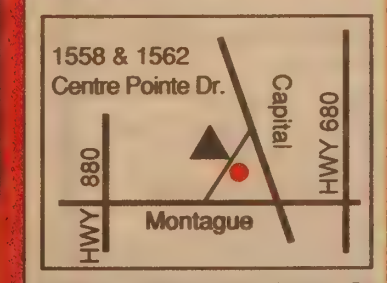

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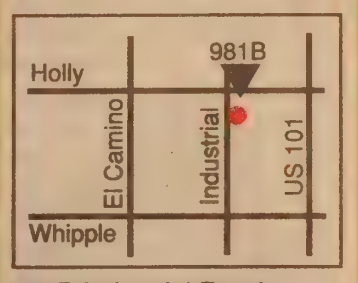

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Beethoven/Liszt - *Symphony No. 9* - WNM 15009
Anton Bruckner - *Symphony No. 9* - WNM 15004
Gustav Holst - *The Planets* - WNM 15001
Gustav Mahler - *Symphony No. 5* - WNM 15007
W.A. Mozart - *Abduction From the Seraglio* - WNM 15006

GOLD DISK'S VIDEODIRECTOR

Gold Disk has shipped VideoDirector, a home video editing system. The system consists of the VideoDirector software, a universal "learning" infrared remote controller, and a serial port interface for controlling VCRs or camcorders equipped with remote, Control-L, or LANC inputs. The system allows users to view their video tapes using the computer to control the camcorder and VCR.

Any number of sections or clips can be selected, named, and arranged in any order. VideoDirector will then assemble the clips into an accurately edited final tape. VideoDirector also maintains a video database of each clip the user defines. The database keeps track of the clip's name, the name of the tape containing the clip, and the clip's exact location on the tape. Any clip in the database may be located and played.

Editing features include push button copying, cutting, and pasting of clips and groups of clips. A manual mode allows for the use of non-remote-controllable video equipment. On-screen prompts instruct the user to enter tape counter information and position the tape when required. VideoDirector supports the Digital Creations SuperGen for the addition of titles or graphics. Video interfaces to the Panasonic Selectra AG 1960/RS VCR, the Sony VDeck, the NEC PC-VCR, and the Selectra VuPort and Sony VBox are also supported.

VIDEO AGE

If you're using your Amiga for video work and have money burning a hole in your pocket, you may want to subscribe to *Video Age*, the newsletter of the Association of Professional Videographers. This newborn association and its newsletter are targeted at wedding, special event, instructional, industrial, documentary, and broadcast videographers. Talk about casting a wide net!

The first issue, all twelve pages of it, covers production techniques (use music to set the tone of your production), low-cost TBCs, practical editing formats, and other standard fare. Who knows, this might go somewhere. ■

Alpha Business Computing, Inc.

408-441-8732

Basic Systems

286-16	$252
386-16SX	$299
386-25DX	$368
386-33DX w/64K Cache	$415
386-40DX w/64K Cache	$425
486-33DX w/64K Cache	$728
486-33DX w/256K Cache	$772

Monitors, Graphics Cards

14" SVGA (1024x768) .28mm	$264
14" SVGA Non-Interlaced	$318
14" VGA (640x480) .41mm	$209
Super VGA Card / 512KB	$43
Super VGA Card / 1MB	$68
Standard VGA Card / 256KB	$30
Orchid Pro Designer IIS	$170

Hard Drives

40MB IDE	$195
85MB IDE	$275
105MB IDE	$295
125MB IDE	$335
210MB IDE	$570

Motherboard w/CPU

Subtract $181 From Basic Systems.

All Basic Systems Include:

- Motherboard & CPU
- 1MB Memory
- 1.2MB or 1.44MB Floppy Drive
- 2HD/2FD Controller
- Math Coprocessor Socket
- 2 Serial/1 Parallel/1 Game Ports
- 101 Enhanced Keyboard
- Mini Tower or Baby AT Case w/230W Power Supply

Additionals

Each Additional 1MB RAM	$39
Each Additional Floppy Drive	$52
2400 Internal Modem	$39
9600 Internal FAX Modem	$72
3-Button Serial Mouse	$14
Z-NIX Mouse w/Windows 3.0	$58
MS DOS 5.0	$38

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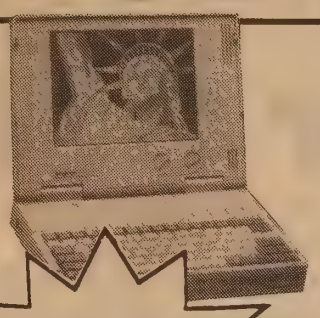
1630 Oakland Road, A204-3, San Jose, CA 95131 Tel: 408-441-8732 Fax: 408-441-9208

Songtech International, Inc.

TEL: 510-770-9051
FAX: 510-770-9060

POWERFUL PORTABLES!

386-SX NEW NOTEBOOK COMPUTER



- 386SX-20 CPU
- 2 MB Memory Exp to 4 MB
- 80 MB Hard Disk (40/60 MB Available)
- 3.5″ 1.44 MB FDD
- Serial/Parallel/VGA Port
- VGA Backlit Screen 640x480
- AC/DC Adapater & Fast Charger Option
- Runs on Ni-Cad AA Size Batteries
- 80 Key Keyboard
- Only 11.5″ (L) x 8.5″ (W) x 2″ (H)
- Only 5.7 LBS

$1645

CRT PORTABLE w/9″ MONITOR (720x350 TTL) $345

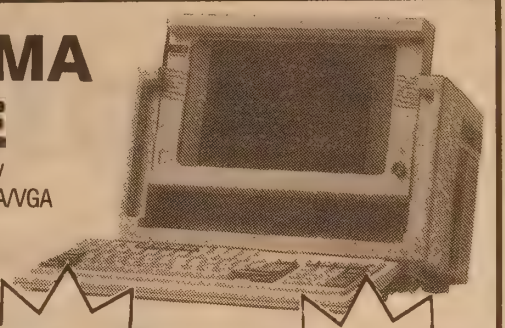
KINGTECH LCD PORTABLE

- 640 x 480 Supertwist LCD Screen w/Built-in Backlight
- Run VGA/EGA/CGA/MGA Mode
- 200 Watt 110/220 Auto Switch P/S
- Detachable 89-Key Keyboard
- Two 5.25″ FDD, One 3.5″ HDD
- Six Expansion Slots
- Weight: 16 lbs.
- Dimensions: 16″ (W) x 9″ (H) x 7 ″ (D)

$545 CGA

$795 VGA

GAS PLASMA PORTABLE

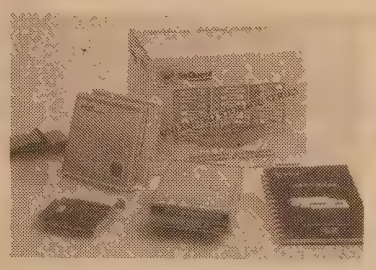


- High Resolution Gas Plasma Display
- 640x400 Pixel Graphics Display CGA/VGA
- 80 Characters x 25 lines
- 9.25″ x 6″
- Detachable 84-Key Keyboard
- 110/220 VAC Auto Switching
- RS-232 Serial Port
- Parallel Printer Port
- External Monitor Port
- Soft carrying bag

$1155 VGA

$1295 VGA+

SYQUEST 44MB REMOVABLE HARD DRIVE INCLUDES:

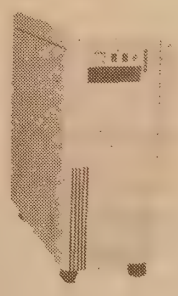


$475

44 MB HARD DRIVE,
2 cartridges, 1 SCSI ADAPTER
External Available

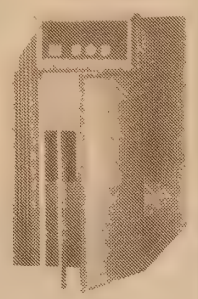
NEW GENERATION OF CASES

BIG TOWER



SE-AT-29

MED TOWER



SA-AT-23

COMPLETE SYSTEMS & PERIPHERALS

486-33 MHz w/64K Cache	$895
486-25 MHz w/128K Cache	$780
386-40 MHz w/64K Cache	$520
386-33 MHz w/64K Cache	$495
486-50 MHz w/64K Cache	$1195
386-25 MHz	$430
386-25 SX w/32K Cache	$375
386-16 SX	$345
286-16 MHz	$295
286-12 MHz	$280

SYSTEM CONFIGURATIONS:

- QUALITY MOTHERBOARD
- 1 MB MEMORY
- 1.2 OR 1.44 MB FLOPPY DRIVES
- 1:1 FDD/HDD CONTROLLER
- MULTI I/O (2S/1P/1G)
- AT CASE w/200 WATT P.S.
- ENHANCED 101 KEYBOARD

KEYBOARDS

Enhanced 101 Click (baby)	$32
MTEK 104 (click)	40
Maxi-Switch 101	40
Omnikey Ultra 130	105
Omnikey 101/102	75

COMPUTER CHASSIS

Fliptop Case w/200W PS	$75
Slide-In Case w/200W PS	79
Mini-Tower w/200W PS	59
Med-Tower w/200W PS	95
Big-Tower w/300W PS	445

POWER SUPPLY

230W XT/AT	$45
285W AT	55
300W AT	65

EPROM PROGRAMMERS

EPROM Programmer, EW-901B (1 Port)	$95
EPROM Programmer, EW-904B (4 Ports)	125
EPROM Programmer, EW-701 (1 Port)	125
EPROM Programmer, EW-704 (4 Ports)	160
EPROM Programmer, EW-708 (8 Ports)	235
EPROM Eraser (with Timer, 15 Chips)	90
Universal Programmer & Tester Expro-60	525

HARD DISK SPECIALS

HH1050 44 MB MFM	$169
Conner 120 MB 19ms IDE	CALL
Conner 200MB 19ms IDE	CALL
Quantum 52 MB IDE	CALL
Quantum 120 MB IDE	CALL
Seagate ST 1239, 210 MB, 15ms IDE	CALL
Seagate ST3144 IDE	CALL
Conner 60 MB	CALL
Quantum 240 MB	CALL
Maxtor 120 MB 16ms IDE	CALL

CONTROLLER CARDS

MFM 1:1 Controller	$30
IDE I/O	30
AT I/O (2S/1P)	15

MONITORS & DISPLAY CARDS

12″/14″ Mono	$79/95
Super VGA 0.28 1024x768	265
Oak VGA Card 16 Bit, 256K	45
Trident Super VGA 16 Bit, 1 MB	95
Nanao 16″ 9070U	945
Sony 1304HG 14″	585
Impression 14″ Super VGA	285
Impression 14″ Non-Interlace	350

LAN Network Interface Cards:

Ethernet 8/16 Bit	$139/165
Arcnet 8/16 Bit	89/139

OTHER MODELS AVAILABLE
CALL FOR BEST PRICES
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RESOURCES

Calendar Of Events

MAY

May 9 Computer Show & Sale. San Francisco Cow Palace. Richard James Corp. Call: 1-800-533-7220. BBS: (415)464-6408.

May 9 Intro To Networks Workshop. Oakland. Excel Micro Solutions. Call: (510)836-2040.

May 11 Intro To DOS Class. Walnut Creek. Computer Education Center. Call: (510)937-2566.

May 11 Quark Intensive 1 Class. San Francisco. Media Alliance Computer Access. Call: (415)771-7133.

May 11–13 Managing The Migration To Client-Server Architectures Seminar. San Francisco. Technology Transfer Institute. Call: (310)394-8305.

May 12–13 PC Repair Workshop. Oakland. Excel Micro Solutions. Call: (510)836-2040.

May 12–15 Intermediate AutoCAD Seminar. San Francisco. SF State University Extended Education. Call: (415)338-1205.

May 13 Channel Strategies For The '90s Forum. Palo Alto. MIT/Stanford Venture Laboratory. Call: Stacey, (415)329-0510.

May 13 Computers In The Search For Public Health Workshop. San Francisco. UCSF. Call: Terry Olesen Hermes, (415)759-9929.

May 13 Intro To Paradox Class. Walnut Creek. Computer Education Center. Call: (510)937-2566.

May 13–14 The Acceleration Of Multimedia Communications Symposium. Palo Alto. Center for Telecommunications at Stanford and Accel Partners. Call: Brenda Santumauro, (415)725-0479.

May 14 Emerging Technology Lecture Series: Virtual Reality, Planetary Exploration, And You. Santa Clara. Computer Literacy Bookshops and UC Santa Cruz Extension. Call: 1-800-660-8639.

May 14 Excel Class. Walnut Creek. Computer Education Center. Call: (510)937-2566.

May 14–15 Advanced Data Communications Class. San Francisco. Data-Tech Institute. Call: (201)478-5400.

May 15 Intermediate WordPerfect 5.1 Class. Emeryville. Northwest Computer Systems. Call: (510)653-0808.

May 15, 22 & 29 A Second Course In PageMaker: DTP On A Macintosh. Santa Clara. Mission College. Call: (408)748-3732.

May 16 Build & Upgrade An IBM PC Clone Workshop. Oakland. Excel Micro Solutions. Call: (510)836-2040.

May 16 Computer Mart. Cupertino. De Anza College Special Events. Call: (408)864-8350.

May 16 Computer Show & Sale. Santa Clara County Fairgrounds. Richard James Corp. Call: 1-800-533-7220. BBS: (415)464-6408.

May 16 Computer Show & Sale. Solano County Fairgrounds, Vallejo. MarketPro. Call: (415)388-8893.

May 16 Intermediate Mac Class. San Francisco. Media Alliance Computer Access. Call: (415)771-7133.

May 16–30 Principles Of Animation Class. San Francisco. Center for Electronic Art. Call: (415)882-7063.

May 17 Computer Show & Sale. Centennial Hall, Hayward. MarketPro. Call: (415)388-8893.

May 18–20 Entrepreneurial Technology Transfer Conference And Expo: The Critical Success Factors For Intra- And Entrepreneurs. San Francisco. MIT Enterprise Forum. Call: (617)862-0397.

May 18–21 Micro Focus User Conference. Santa Clara. Micro Focus. Call: (415)496-7356.

May 19 Microsoft Word For Windows Class. Walnut Creek. Computer Education Center. Call: (510)937-2566.

May 19–20 Fifth Annual International Quality Week Conference. San Francisco. Software Research, Inc. Call: 1-800-942-SOFT. Internet: qw@soft.com.

Continued

MAY 18–20

THE ENTREPRENEURIAL TECHNOLOGY TRANSFER CONFERENCE

Airport Hyatt Regency Hotel, San Francisco

This conference offers a world class forum for participants to acquire the knowledge, skills, and tools for commercializing emerging technologies from industry, universities, and government. Over twenty-five conference sessions, interactive tutorials, and exhibits will be offered. Speakers will include Joe P. Allen, director, planning and development, National Technology Center; C. Gordon Bell, author of *High Tech Ventures*; and Robert A. Burton, New Enterprises, Motorola, Inc. MIT Enterprise Forum, Inc. Call: (617)862-0397.

JUNE 22–JULY 17

INTRO TO MUSIC SYNTHESIS AND PROGRAMMING USING NEXT WORKSTATIONS

Stanford University

This workshop, offering three weeks of hands-on instructions, followed by one week of independent work, will cover basic use of the NeXT workstation for composers. Theory and programming of on-board synthesis techniques will be explored as well as Yamaha SY77 digital synthesizers. Software environments for composition and interactive MIDI control will also be covered. Students will learn to customize the system, programming within these environments for their own work. For applications and information, contact: Center for Computer Research in Music and Acoustics, Dept. of Music, Stanford University, Stanford, CA 94305-8180. (415)723-4971.

BUY AMERICAN...BEST BUY!

50-MHz 486 ISA PC

Axik Ace Cache 486/WB-50

BEST PRICES, QUALITY SERVICE BACKED BY 7 YEARS MOTHERBOARD DESIGN/ MANUFACTURER & SYSTEM INTEGRATION EXPERIENCE

Criterion	(Weighting)	Score
Performance		
Speed-		
CPU intensive	(50)	Very Good
Disk intensive	(50)	Very Good
Multitasking	(50)	Very Good
Database server	(75)	Excellent
File server	(75)	Excellent
Compatibility	(150)	Excellent
Expandability	(100)	Excellent

In database server test, the **Axik** surpassed Dell, the previous leader, by 5 percent in transactions per minute (TPM). The **AXIK** was 4 percent faster than ALR. In the previous review, we attributed part of Dell's efficiency to its three-bay drive array. The **Axik** excels in this capacity with only one drive.

The **Axik ACE** is a superior high-end file server with an extremely low price.

Info World 2/24/92

Reviewed By

INFO WORLD

Feb 24, 1992

APPLICATIONS TESTS			INFO WORLD	
486/50 PCs				
(test times in minutes:seconds)				
	AXIK ACE CACHE 486/WB-50	**ALR Powerpro 486/50**	**Compaq (1) Deskpro 486/50L**	**Dell (1) Powerline 450SE**
PRICE	**$4,399**	**$12,889**	**$12,999**	**$12,899**
File server tests				
Office test 24-station	01:57	01:59	01:53	01:52
Database file server(2)	1.70	1.64	0.71	1.61
Workstation tests				
CPU intensive	07:24	06:29	06:23	07:32
Disk intensive	21:36	17:53	15:59	23:48
Multitasking	01:23	01:03	01:02	01:08

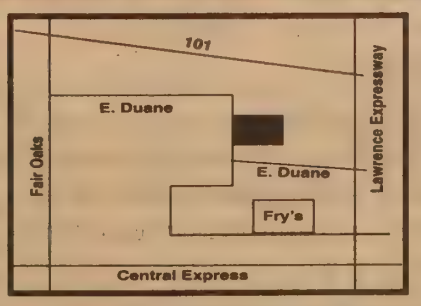
1)Compaq Deskpro 486/50L and Dell Powerline 450SE Reviewed January 20, page 97

2) Transaction per minute for 24 stations, with a theoretical maximum of 6.0; higher indicate better performance

SYSTEM	MB +CPU	BASIC SYSTEM	BASIC + 40 MB HD +12"	BASIC + 40 MB HD +VGA	BASIC + 40 MB HD +SVGA	BASIC + 80 MB HD +SVGA	BASIC + 120 MB HD +SVGA	BASIC + 200 MB HD +SVGA
486-50C EISA	$1359	$1539	$1809	$1959	$1999	$2099	$2169	$2359
486-33C EISA	1059	1239	1509	1659	1699	1799	1869	1959
486-50/256K	–	–	Best	Best	Best	Best	Best	Best
486DX2-50/64K	899	1079	1349	1499	1539	1639	1709	1899
486-33/64K	569	749	1019	1169	1209	1309	1379	1569
486-25/64K	519	699	969	1119	1159	1259	1329	1519
486SX-25/64K	359	539	809	959	999	1059	1129	1359
386-40/64K	289	469	739	889	929	1029	1099	1289
386-33/64K	279	459	729	879	919	1019	1089	1279
386-25	209	389	659	809	849	949	1019	1209
386SX-25	159	339	609	759	799	899	969	1159
386SX-16	139	319	589	739	779	879	949	1139
286-16	79	259	529	679	719	819	889	1079

BASIC SYSTEMS INCLUDE: M/B, CPU, 1 MB RAM, (512KB For 286) 1:1 2 FD/2 HD Controller, I/O (2S/P/G), 1.2 MB or 1.44 MB FD, Math Co-Processor Socket, Case + Power Supply, 101-Key Enhanced Keyboard.

- One Year Parts & Labor Warranty
- Prices Reflect COD Price
- Prices & Availability Subject To Change W/O Notice
- Shipping, Insurance & COD Charges Are Extra & Non-Refundable
- Not Responsible For Typo Errors.
- Trademarks Are By Respective Companies



Next To Deli Cafe

Axik

Axik Computer, Inc.

A Technical Service Company

MasterCard VISA

HOURS:
Mon-Fri: 9-6:30
Sat: 10-4:30

1031 East Duane Ave., #F
Sunnyvale, CA 94086
TEL: (408) 735-1234
FAX: (408) 735-1437

NoteStar Notebook Computers

Model	Price
16 MHz 386SX/40 MB	$1,533
16 MHz 386SX/60 MB	1,560
16 MHz 386SX/80 MB	1,641
16 MHz 386SX/120 MB 8 MB RAM	2,156
20 MHz 386SX/40 MB	1,721
20 MHz 386SX/60 MB	1,748
20 MHz 386SX/80 MB	1,829
20 MHz 386SX/120 MB 8 MB RAM	2,344
25 MHz 386SL/60 MB	1,793
25 MHz 386SL/80 MB	1,874
25 MHz 386SL/120 MB	2,059
25 MHz 386SL/120 MB 8 MB RAM	2,389

All Computers Come Complete With DOS 5.0, PereLine Communications Software, NoteStar Utility Software, A Leather Carrying Case, Autoswitching 110/220 V AC Adapter, External Keyboard Adapter Cable, 2 Batteries, 2 MB Of Memory, 1 Serial Port, 1 Parallel Port, 64 GrayScale VGA Screen With External Connector.

Built-In Power-Saving Features Automatically Conserve Energy When Not In Use. Average Battery Operation Time Per Charge is From 3 to 5 Hours. **NoteStar Provides A Full 1 Year Warranty And Guarantees 48 Hr. Turnaround Or You Receive A New Machine!**

Ergonomically Sloped Keyboard Has Inverted T for Cursor Keys, and Separate Keys for Ins, Del, Home, PgUp, PgDn and End.

OPTIONAL FEATURES INCLUDE:

Option	Prices
Ethernet Module	$173
Modem Module 2400	120
FAX Send/Receive 2400	195
External 5.25" Floppy	232
Car Adapter Cable	25
SCSI Interface	85
3 Button Serial Mouse	29
Memory 2 MB Increments	110

Plus More

PereLine Data Systems
750 Camden Ave, Suite B
(Off Winchester Blvd & San Tomas Exp)
Campbell, Ca 95008
Tel: (408) 364-2770
Fax: (408) 364-2788
Prices subject to change w/o notice

Calendar Of Events continued

May 19–21 Analyzing User Requirements Seminar. San Francisco. DCI. Call: (508)470-3880.

May 19–June 2 Oasis Class. San Francisco. Center for Electronic Art. Call: (415)882-7063.

May 20 Intermediate FoxPro 2.0 Class. Emeryville. Northwest Computer Systems. Call: (510)653-0808.

May 20 SEF Meeting: Software Development Partnering Opportunities With Apple. Palo Alto. SEF. Call: Barbara Cass, (415)364-1571.

May 20–21 Windows 3.0 & 3.1 Class. San Francisco. Data-Tech Institute. Call: (201)478-5400.

May 21 Accounting Systems Seminar: Tax And Managerial Reporting. Oakland. David Simon, CPA. Call: (510)893-5753.

May 21 Intro To WordPerfect For Windows Class. Walnut Creek. Computer Education Center. Call: (510)937-2566.

May 21–22 Q&A: Database/Word Processing Software Workshop. San Francisco. Symantec Training Group. Call: 1-800-786-8620.

May 21–23 Desktop Video '92 Expo. Hyatt Regency Burlingame. Ami Expo, Inc. Call: 1-800-332-6442.

May 22 AutoCAD Information Seminar. San Francisco. SF State University Extended Education. Call: (415)338-1205.

May 22 Wireless LAN Seminar. Oakland. Informational Data Network. Call: (510)465-9084.

May 23 Computer Show & Sale. Baybridge Holiday Inn, Emeryville. MarketPro. Call: (415)388-8893.

May 24 Computer Show. San Francisco. Ft. Mason Shows. Call: (916)725-0228.

May 26 Intro To Windows 3.0 Class. Emeryville. Northwest Computer Systems. Call: (510)653-0808.

May 26 WordPerfect Desktop Publishing Class. Walnut Creek. Computer Education Center. Call: (510)937-2566.

May 27 Advanced FoxPro 2.0 Class. Emeryville. Northwest Computer Systems. Call: (510)653-0808.

May 27 Europe In The 1990s Seminar: Seminar Exploring The Challenges And Opportunities For Hi Tech Companies. San Jose. Lochridge & Co. Call: Celia Kirwan, 1-800-829-6759.

May 27 Intermediate Lotus 1-2-3 Class. Walnut Creek. Computer Education Center. Call: (510)937-2566.

May 28 Beginning Word 2.0 For Windows Class. Emeryville. Northwest Computer Systems. Call: (510)653-0808.

May 28 Desktop Video/Multimedia Seminar. San Francisco. SF Video. Call: (415)227-0200.

May 28 Intro To Data Communications Seminar. Oakland. Informational Data Network. Call: (510)465-9084.

May 28–29 QuickTime: The Conference & Film Festival. San Francisco. MacWorld Communications. Call: (415)267-1745.

May 30 Computer Show & Sale. Santa Clara Convention Center. MarketPro. Call: (415)388-8893.

May 30 Mac Basics Class. San Francisco. Media Alliance Computer Access. Call: (415)771-7133.

May 30 PC Memory Management Seminar. San Francisco, SFPC User Group. Call: (415)821-1310.

May 30 WordPerfect 5.1 For DOS Seminar. San Francisco, SFPC User Group. Call: (415)821-1310.

May 31 Computer Show & Sale. Marin Civic Center. MarketPro. Call: (415)388-8893.

May 31–June 6 Borland's Database Conference. Palm Desert. Borland. Call: 1-800-942-8872.

JUNE

June 1–3 Collaboration '92: Conference Exploring The Intersection Of Corporate Culture And Information Technology. San Francisco. The Graphic Communications Association. Call: (703)519-8160.

June 1–3 PageMaker Conference And Exposition. Seattle. Aldus. Call: Kim Foster, 1-800-221-3806.

June 1–4 Pen Computing Conference. Santa Clara. Boston University. Call: (508)649-9731, ext. 248.

June 2 Intro To PageMaker 4.0 Class. Emeryville. Northwest Computer Systems. Call: (510)653-0808.

June 2–3 MS-DOS For CAD Course. San Francisco. SF State University Extended Education. Call: (415)338-1205.

June 3 Seminar For End Users On Imaging—The Latest Revolution In Information Management. San Francisco. Novell and Ryno Computer Systems. Call: 1-800-366-7966.

Continued

CERTIFIED QUALITY & SERVICE

486 / 386 Basic Systems

Include:
- Motherboard & CPU
- 1.2Mb or 1.44Mb Floppy Drive
- 2S, 1P, 1G Ports
- 1Mb RAM Installed
- Internal Clock/Calendar
- AT Case + 200W P.S.
- IDE 1:1 2HD/2FD Controller
- Math Coprocessor Socket
- 101 Key Enhanced Keyboard

All Systems Come with 1 year Parts & Labor

Basic System with 1 MB **486-50 w/64K Cache**	$ 1299
Basic System **486-33 EISA w/Cache**	$ 1338
Basic System with 1 MB **486-33 w/Cache**	$ 818
Landmark 54 MHz, Basic System w/ 1 MB **386-33 w/64K Cache**	$ 498
Landmark 30 MHz, Basic System 1 MB **386-25 w/64K Cache**	$ 448
Landmark 21MHz, Basic System with 1 MB **386-25SX**	$ 358
Landmark 16MHz, Basic System with 1 MB **386-16SX**	$ 338

COMPLETE SYSTEMS

486-50MHz w/Cache
- Basic System Configuration
- 120 MB Hard Disk IDE
- 14" SVGA Monitor (1024x768)
- with VGA card 512K

$ 1688

486-33MHz w/Cache
- Basic System Configuration
- 120 MB Hard Disk IDE
- 14" SVGA Monitor (1024x768)
- with VGA card 512K

$ 1388

386-40MHz w/64KB
- Basic System Configuration
- 120 MB Hard Disk IDE
- 14" SVGA Monitor (1024x768)
- with VGA card 512K

$ 1128

386-33MHz w/64KB
- Basic System Configuration
- 120 MB Hard Disk IDE
- 14" SVGA Monitor (1024x768)
- with VGA card 512K

$ 1098

386-25MHz DX
- Basic System Configuration
- 80 MB Hard Disk IDE
- 14" SVGA Monitor (1024x768)
- with VGA card 512K

$ 968

386-16MHz SX
- Basic System Configuration
- 40 MB Hard Disk IDE
- 14" SVGA Monitor (1024x768)
- with VGA card 512K

$ 768

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Calendar Of Events continued

June 4 UNIX Network Programming In The 1990s: Presentation By Author Dr. W. Richard Stevens. Santa Clara. Computer Literacy Bookshops and UC Santa Cruz Extension. Call: 1-800-660-8639.

June 4–July 2 An Intro To Microcomputers Course. San Francisco. SF State University Extended Education. Call: (415)338-1205.

June 6 Build & Upgrade An IBM PC Clone Workshop. Oakland. Excel Micro Solutions. Call: (510)836-2040.

June 6 Computer Show & Sale. Oakland Coliseum. Richard James Corp. Call: 1-800-533-7220. BBS: (415)464-6408.

June 7 Computer Show & Sale. Contra Costa Fairgrounds, Antioch. MarketPro. Call: (415)388-8893.

June 8–10 Securing Your Networks Conference. San Antonio, TX. Computer Security Institute. Call: (415)905-2626.

June 8–12 USENIX Summer 1992 Technical Conference. San Antonio. USENIX Assoc. Call: (714)588-8649.

June 9–11 Leading The Transformation Of Information Systems Executive Retreat. San Francisco. Technology Transfer Institute. Call: (310)394-8305.

June 9–11 Netucon '92: A NetWare Users Conference. San Jose. NCNUA. Call: (408)279-4155.

June 9–12 Intro To AutoCAD Seminar. San Francisco. SF State University Extended Education. Call: (415)338-1205.

June 9–16 Macromind Director Class. San Francisco. Center for Electronic Art. Call: (415)882-7063.

June 10 Intermediate Paradox 3.5 Class. Emeryville. Northwest Computer Systems. Call: (510)653-0808.

June 10 Intro To Quattro Pro Class. Walnut Creek. Computer Education Center. Call: (510)937-2566.

June 10–July 1 Claris CAD Class. San Francisco. Center for Electronic Art. Call: (415)882-7063.

June 11 Intro To Paradox Class. Walnut Creek. Computer Education Center. Call: (510)937-2566.

June 11–12 PC Repair Workshop. Oakland. Excel Micro Solutions. Call: (510)836-2040.

June 12 Intro To Windows Class. Walnut Creek. Computer Education Center. Call: (510)937-2566.

June 13 Computer Show & Sale. San Francisco Cow Palace. Richard James Corp. Call: 1-800-533-7220. BBS: (415)464-6408.

June 14 Computer Show & Sale. Scottish Rite Center, Sacramento. MarketPro. Call: (415)388-8893.

June 16–18 AutoCAD 3D Features Course. San Francisco. SF State University Extended Education. Call: (415)338-1205.

June 18 Accounting Systems Seminar: Tax And Managerial Reporting. Oakland. David Simon, CPA. Call: (510)893-5753.

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May 30 - SANTA CLARA
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* May 31 - SAN RAFAEL
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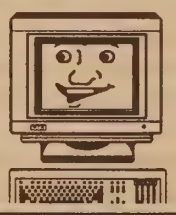

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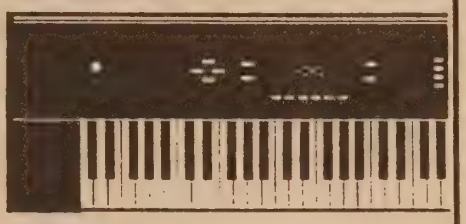

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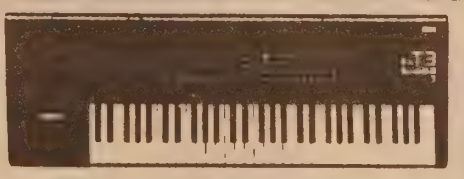

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Calendar Of Events continued

June 18 Advanced Paradox 3.5 Class. Emeryville. Northwest Computer Systems. Call: (510)653-0808.

June 18 Intro To Networks Workshop. Oakland. Excel Micro Solutions. Call: (510)836-2040.

June 18 NetWare Service And Support Seminar. Oakland. Informational Data Network. Call: (510)465-9084.

June 18–19 Project Planning Software Workshop. San Francisco. Symantec Training Group. Call: 1-800-786-8620.

June 19 Intermediate WordPerfect 5.1 Class. Emeryville. Northwest Computer Systems. Call: (510)653-0808.

June 20 Computer Mart. Cupertino. De Anza College Special Events. Call: (408)864-8350.

June 20 Computer Show & Sale. Solano County Fairgrounds, Vallejo. MarketPro. Call: (415)388-8893.

June 20 Computer Show & Sale. Santa Clara County Fairgrounds. Richard James Corp. Call: 1-800-533-7220. BBS: (415)464-6408.

June 20 Video Design Principles Class. San Francisco. Center for Electronic Art. Call: (415)882-7063.

June 20 & 27 PC Repair Workshop. Oakland. Excel Micro Solutions. Call: (510)836-2040.

June 21 Computer Show. San Francisco. Ft. Mason Shows. Call: (916)725-0228.

June 21 Computer Show & Sale. Sonoma County Fairgrounds, Santa Rosa. MarketPro. Call: (415)388-8893.

June 22 Wireless LAN Seminar. Oakland. Informational Data Network. Call: (510)465-9084.

June 23–25 Digital World Conference & DemoCenter. Beverly Hills. Seybold Seminars. Call: 1-800-777-6650.

June 24 Intro To Windows 3.0 Class. Emeryville. Northwest Computer Systems. Call: (510)653-0808.

June 25–26 PC Repair Workshop. Oakland. Excel Micro Solutions. Call: (510)836-2040.

June 25–26 Q&A: Database/Word Processing Software Workshop. San Francisco. Symantec Training Group. Call: 1-800-786-8620.

June 25–26 Telecommunications Technologies For The Non-Engineering Professional Seminar. San Francisco. Data-Tech Institute. Call: (201)478-5400.

June 26 Beginning Word 2.0 For Windows

Continued

JUNE–AUGUST

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Class. Emeryville. Northwest Computer Systems. Call: (510)653-0808.

June 27 Computer Show & Sale. San Mateo Expo Center. Richard James Corp. Call: 1-800-533-7220. BBS: (415)464-6408.

June 27 Intro To DOS Seminar. San Francisco, SFPC User Group. Call: (415)821-1310.

June 27 Seminar Comparing OS/2 v2.0 And Windows 3.1. San Francisco, SFPC User Group. Call: (415)821-1310.

June 27 Using Your Modem To Call A BBS Seminar. San Francisco, SFPC User Group. Call: (415)821-1310.

June 28 Computer Show & Sale. Centennial Hall, Hayward. MarketPro. Call: (415)388-8893.

June 29 Intro To Data Communications Seminar. Oakland. Informational Data Network. Call: (510)465-9084.

June 30–July 21 Integrated Media Production I Class. San Francisco. Center for Electronic Art. Call: (415)882-7063.

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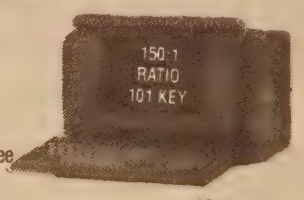

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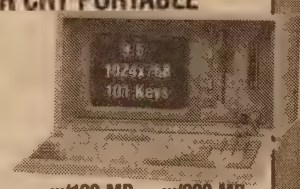

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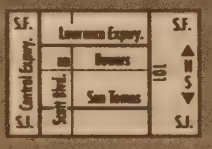

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By Kathleen Creighton

Christian Networks

There is a wide variety of Christian networks, such as Computers for Christ, Christian Fellowship Net, and AgapeNet. Most boards which carry message areas from one or more of these networks post their belief systems prominently.

One of these networks, Computers for Christ (CFC), was founded in San Jose by John Marler. (CFC Headquarters BBS 408/997-2790, 2400 baud, 8-N-1, John Marler, sysop) CFC is a network of about thirty nodes in the US, Canada, and England; it sponsors the Christ-Net message area, a born-again Christian fellowship conference and discussion area. CFC Headquarters BBS also carries national message areas, including Bible focus, computers in church, Armageddon, and cult watch. Although CFC, like all religious networks, has a strong point of view, the showing of disrespect toward the beliefs of others (or lack of beliefs) is strongly discouraged.

Corpus Christi BBS in Napa (707/252-4830 [Napa], 707/939-9206 [Sonoma], 707/795-3382 [Rohnert Park], 2400 baud, 8-N-1, Gary Bradford, sysop), perhaps the most ambitious of any religious BBS in the Bay Area, carries selections from eight different Christian networks and Fidonet, and has over one hundred message areas. Message areas include Bible news, abortion, home school, and Christian teen, plus some areas of general interest.

Corpus Christi encourages downloads from its thirty file areas, mostly specializing in Christian, Computers for Christ, and IBM files. The Christian text files are available on disk through the mail from Christian Distribution Network. There are also online programs which range from Christian games to Bible topical information, and Bible search programs for both King James and Greek versions. A list of Northern California Christian BBSes is displayed on logout. There is also a file of phone number prefixes toll-free within the board's three calling area exchanges—a thoughtful offering in the toll-call intensive Bay Area.

Orthodox Christian BBS (USA) carries Orthodox Christian Network message areas, as well as Christian Fellowship Network echos. (408/993-0738, 2400 baud, 8-N-1, Fr. George Masters, sysop) Fr. Masters is an Orthodox Christian priest and a computer professional interested in the potential for BBS systems to do missionary work. The campus ministry department and one Orthodox Christian seminary are in the process of going online, and there are plans to bring their theological library online as well.

Logos BBS in Seaside (Monterey Peninsula) carries NewLife Christian Network echos. NewLife Christian Network is comprised of about thirty-five very active BBSes nationwide, and includes echo areas such as theology, abortion, cults, and recovery. The BBS also maintains message areas for Christian media, creationism, spiritual warfare, and sports. (408/899-4552, 2400 baud, 8-N-1, Dan Byrnes, sysop)

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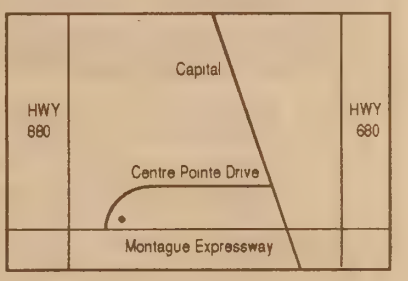

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Second Source Parts, Inc. (408)248-3870. 8-N-1, 24 hrs., 300/1200/2400. Medical equipment, new & used parts, consumables, info & more. [Exp. #95.]

ShrinkTank BBS. (408)257-8131. 8-N-1, 300/1200/2400 & 9600 for SuperModem users. Mental Health, psychology, Men's Issues, Metrolink conferences. All users welcome! Sysop: Rob Bischoff, Ph.D. [Exp. #95.]

The Silicon Connection. (408)492-9700. 24 hrs., 300/1200/2400. Electronic PenPal Network, 16 lines. [Exp. #97.]

Skies The Limit BBS. (408)254-1192. 1200/2400/9600. Files for everyone. Membership and non-membership areas. [Exp. #97.]

Spectrox Systems. (408)252-1005. 1200/2400. From Cupertino, tons of programs for MS-DOS, Windows, Mac, and UNIX. Free Usenet and UUCP mail access. Usenet Newsgroup. Sysop: Aaron Anderer. [Exp. #95.]

The Spider's Den BBS. (408)266-9835. Windows files, doors, adult files, and GIFs, 225MB. [Exp. #95.]

SUBBS. (408)765-1695. 300–9600 V.32. Free, public, upload, download, Intel sponsored. Sysop: Mark Elston. [Exp. #97.]

SVCS BBS. (408)956-1204. 8-N-1, 24 hrs., 300/1200/2400/9600. Features MS-DOS, CAD, UNIX, GIF, WIN, LAN, & HAM. SIG conferences and email. Sysop: Fred Townsend. [Exp. #97.]

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415

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ComPUCall. (415)703-1297.

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merly Family Radio Forum) carries several Christian echos, an online Bible search program, and ASCII Bible text available for download, along with a large selection of articles. (510/538-2040, 2400 baud, 8-N-1, Richard Yim, sysop)

Pagan/Occult Distribution Network

Contrary to stereotype, the Pagan/Occult Distribution Network (PODS) provides an eclectic list of spiritual and metaphysical echos, and is the source of the popular INTERFAITH echo which is distributed via Fidonet. PODS echos also include amateur theology, dreams, a cult information echo (the response to the Christian network cult watch echo), herbalist, astrology, tarot, and numerology echos, as well as a pagan rights echo.

Many Bay Area BBSes carry the INTERFAITH echo, and **Alamut**, the San Francisco pagan BBS (415/431-7541, 2400 baud, 8-N-1, Max Delysid, sysop) carries a selection of other PODS echos, along with echos from a very small national pagan network called 93net, and local message areas. **Body Dharma BBS** in Berkeley (510/836-4717, 2400 baud, 8-N-1, Barry Kapke, sysop) carries over twenty PODS echos in its vast echo area.

Skeptic's BBS

If this concentration on religion and spiritual tradition arouses the skeptic in you, **Skeptic's BBS** in San Francisco (415/648-8944, 2400 baud, 8-N-1, Rick Moen, sysop), a private BBS run in support of Bay Area Skeptics, is waiting for your call. Bay Area Skeptics is not anti-religion per se (and its members may or may not be affiliated with religious institutions), and has no position on religion except insofar as the religious institution claims an erroneous scientific basis for its belief, or impinges on the constitutionally mandated separation of church and state. There is a church/state echo area here, a creationism echo, as well as the Usenet group talk.origins.

But Bay Area Skeptics are more well known for taking a critical look at paranormal and fringe-science issues, and advocating an open-minded but skeptical point of view. There are message areas supporting both, and Usenet groups alt.paranormal and sci.skeptic, making Skeptic's BBS a unique Bay Area resource.

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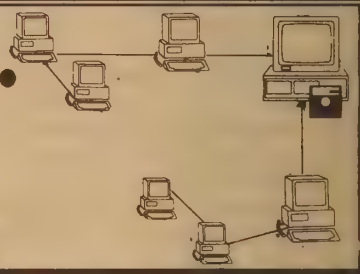

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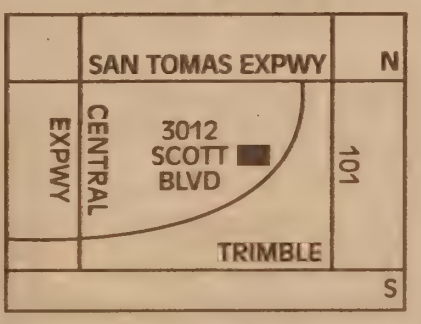

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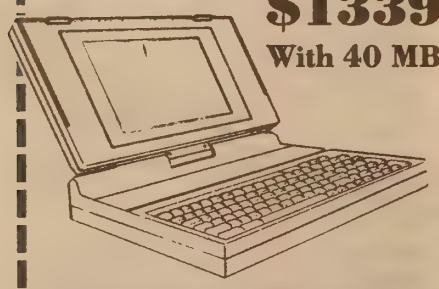

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Association For Women In Computing. Meetings: 1st Wed., 5:30 pm, San Francisco. Call: (415)979-8450. [Exp. #99.]

Association Of Database Developers (ADD). Meetings: 2nd Thurs., 7:00 pm, Fort Mason Center, San Francisco. Organization for professional xBASE language systems developers. Membership $50/yr or $5/meeting. Call: Lisa, (510)339-6777. General info: JoAnn, (415)863-6706. [Exp. #98.]

The Association For Worldwide Software Support Management. Meetings: 2nd Tues., Milpitas Sheraton. Call: Mikael Blaisdell, (415)865-1323. [Exp. #95.]

The Black Data Processing Associates, Silicon Valley Chapter. Meetings: 4th Thurs., 6:30 pm, Amdahl Corp., Sunnyvale. Call: Doug Jones, (408)737-5999. [Exp. #96.]

Computer Professionals For Social Responsibility. Meetings: 2nd Wed., 7:30 pm, UC Berkeley, Evans Hall, room 608-7. Call: Judy Stern, (510)643-7499. [Exp. #98.]

Data Processing Management Association. Call: (415)978-0868. [Exp. #98.]

IEEE Computer Society, San Francisco Chapter. Meetings: 3rd Wed. Call: (415)905-4400. [Exp. #99.]

Independent Computer Consultants Association, Silicon Valley Chapter. Meetings: 4th Thurs., 6:00 pm. Meetings are open to all. Call: ICCA, (408)492-8888. [Exp. #96.]

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International Computer Professional Association. An association for software professionals who want to work abroad. Call: Tony Rodriguez, (415)252-7467. [Exp. #98.]

International Network Of Women In Technology. Dedicated to significantly increasing the leadership of Women in Technology in industry and government. Call: Dr. Carolyn Turybfill, (415)336-1007. Email: Carolyn Turybfill@Eng.Sun.COM. [Exp. #97.]

Networkers' Toastmasters. Meetings: Every Tues., noon–1:00 pm, 2560 N. First St., San Jose. Call: Mona Kellem, (408)534-1255. [Exp. #98.]

North Bay Systems Professionals. Meetings: 3rd Wed., 7:00 pm, Holiday Inn, Terra Linda, 1010 Northgate Dr., San Rafael. NBSP provides a forum and network for system professionals. Call: Harry Chapman, (415)291-0174. [Exp. #99.]

Robotics Society Of America. Meetings: 2nd Mon., 8:00 pm, Exploratorium Library, San Francisco. Call: Brad Smallridge, (415)550-0588. [Exp. #99.]

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Society For Technical Communication, Berkeley Chapter. Meetings: 2nd Wed., 6:00 pm, Yenching Restaurant, 2017 Shattuck Ave., Berkeley. Call: Rich Julius, (415)837-0397. [Exp #96.]

Society For Technical Communication, East Bay Chapter. Meetings: 1st Thurs. Call: Corinne Stefanick, (510)769-8931. [Exp. #95.]

Society For Technical Communication, San Francisco Chapter. Meetings: 3rd Wed. Call: (415)985-7121. [Exp. #97.]

Software Entrepreneurs' Forum. Call: Barbara Cass, (415)854-7219. [Exp. #97.]

United Sysops Association. Meetings: 2nd Wed., 7:00 pm, Coco's, 1035 S. Mary Ave., Sunnyvale. Organization of bulletin obard sysops and users. Call: Bill Strouse, (408)739-9081. [Exp. #98.]

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A500 Programming Team. A club for those Amiga users who can write programs for A500. Call: Michael, (408)270-4596. [Exp. #95.]

AAA—Amiga Addicts Anonymous. Meetings: 3rd Tues., Concord Water District Bldg., 1311 Concord Ave. Classes, BBS, pub. dom. disks, info line. Call: (510)935-0829. [Exp. #96.]

ACCESS—Amiga & Commodore Computer Enthusiasts Society. Meetings: 2nd Thurs., 7:00 pm, Livermore Airport Terminal. Call: Paul, (510)829-6053. [Exp. #98.]

ALF—Amiga Learners Forum. Meetings: 3rd Sun., 6:00 pm, Cupertino Library. Beginners group. Call: (408)262-9334. [Exp. #100.]

Amiga Nation. Meetings: 1st Tues., 7:30 pm, 324 Springs St., Suisun. Call: (707)421-2283. [Exp. #96.]

AWEST Amiga Users. Meetings: 1st Wed., 7:00 pm, Computer Showcase, 2739 Geary, SF. Call: (415)584-8406. [Exp. #96.]

FAUG—First Amiga User Group. Meetings: 1st Tues., 7:00 pm, HT Electronics, 275 N. Matilda Ave., Sunnyvale. Call: Mike Fisher, (415)855-9426, BBS (415)595-2479. [Exp. #100.]

TOGA—The Other Group Of Amigoids. Meetings: 4th Sat., 12:30 pm, Milpitas Library, 40 N. Milpitas Blvd. Call: Lawrence Brown, (408)984-6036. [Exp. #100.]

APL

APL Bay Area User Group. Meetings: 2nd Mon., 7:00 pm. Call: Tibor Horvath, (415)283-5611. [Exp. #100.]

APPLE

Tri-Valley Apple II User Group. Meetings: 1st Wed., 7:00 pm, Glendale Federal Bank, 3101 Crow Canyon Place, San Ramon. Come and learn more about your computer. Support II+, IIc, IIe, IIgs. Call: (510)828-0959. [Exp. #99.]

APRICOT

Apricot User Group, East Bay Chapter. For Apricot and other IBM-compatible PCs, hardware/software assistance & info. New members welcome. Call: Ron, (510)828-9643. [Exp. #95.]

AT&T

AT&T Computer User Group, North Bay. Meetings: 1st Wed., informal discussion at 6:00 pm, program begins at 7:00 pm, San Francisco AT&T Bldg., 50 Fremont St. MS-DOS and UNIX. Call: Jim Lansing, (415)885-6631 or Joe Mahoney, (415)584-6510; BBS (415)829-6027. [Exp. #99.]

AT&T Computer User Group, South Bay. Meetings: 2rd Wed., informal discussion at 6:00 pm, program begins at 7:00 pm, Sunnyvale AT&T Bldg., 1090 E. Duane Ave. MS-DOS and UNIX Call: Joe Lipsig, (408)733-6522; BBS (408)946-7734. [Exp. #99.]

AT&T UNIX Computer User Group, South Bay. Meetings: 4th Wed., new user education at 6:30 pm, program begins at 7:00 pm, Sunnyvale AT&T Bldg., 1090 E. Duane Ave. Call: Thad Floryan, (408)985-7100; U S E N E T thad@cup.portal.com. [Exp. #99.]

ATARI

Bay Area Atari Users Group (BAAUG). Meetings: 1st Mon., 7:30 pm, Agnews Aud., 2nd fl., San Jose. Call: Joe Fischer, (408)988-3065. [Exp. #95.]

Santa Clara Atari User Group. Meetings: 2nd Wed., 7:00 pm, San Jose Computers Showroom, 1278 Alma Court, San Jose, near First and Alma. Call: Ron Reade, President, (408)225-7162. BBS: (408)848-6032, 300/1200/2400. [Exp. #99.]

ST Programming Team. A club for those Atari users who can write programs for ST/STE. Call: Michael, (408)270-4596. [Exp. #95.]

COMMODORE

64/More CUG, Cupertino Chapter. Meetings: 3rd Sun., 6:00 pm. Cupertino Library. Call: (408)262-9334. [Exp. #100.]

64/More CUG, North Valley Chapter. Meetings: 2nd Sat., 10:00 am. Milpitas Library. Call: (408)262-9334. [Exp. #100.]

ACCESS—Amiga & Commodore Computer Enthusiasts Society. Meetings: 2nd Thurs., 7:00 pm, Livermore Airport Terminal. Call: Paul, (510)829-6053. [Exp. #98.]

CAVE—Commodore Amiga Video Enthusiasts. Meetings: Every other Sat., 8:00 pm, 304 Springs St., Old Suisun. Call: Ron, (707)421-2283. [Exp. #95.]

Commodore Hayward User Group. Meetings: 2nd Sat., 2:00 pm, Palma Ceia Park. (510)793-2514. [Exp. #97.]

CWEST Commodore 64/128. Meetings: 3rd. Wed., 7:00 pm, Fort Mason. For info: 1564

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USER GROUPS

Waller #B, San Francisco, 94117. Call: (415)626-9946. BBS, (415)552-9320. [Exp. #96.]

CP/M

San Francisco Computer Society. Meetings: 7:00 pm, Laguna Honda School, 1350 7th Ave., San Francisco. Call: Ralph Gallegher, (415)929-0252. [Exp. #96.]

dBASE

ADD dBASE Software SIG. Meetings: 3rd Tues, 7:30 pm, Fort Mason Center, San Francisco. Led by Miriam Liskin. Call: JoAnn, (415)863-6706. [Exp. #96.]

ADD Fox Software SIG. Meetings: 1st Thurs., 7:00 pm, Fort Mason Center, San Francisco. Call: JoAnn, (415)863-6706. [Exp. #96.]

East Bay Database User Group. Meetings: 3rd Sun., 1:30 pm, 2415 Grant St., Berkeley. Call: David Chilcott, (510)653-1303. [Exp. #96.]

DESKTOP PUBLISHING

San Mateo County Ventura Publisher User Group. Meetings: 3rd Mon., 6:45 pm, San Mateo ROP, 1800 Rollins Rd., Rm. 14, Burlingame. Call: Elinor Cruze, (415)366-5317. [Exp. #99.]

FREEDOM, PRIVACY, AND TECHNOLOGY

BMUG SIG On Freedom, Privacy, And Technology. Meetings: Last Sun., 2:00 pm, BMUG office, 2055 Center St., Berkeley. Call: Judi Clark, (510)549-2684. [Exp. #100.]

IBM AND COMPATIBLES

Alameda Computer User Group. Meetings: 2nd Wed., 7:30 pm, Social Hall, Temple Israel, Island Dr. and Mecartney Rd. Providing an informal forum for both Macintosh and PC users to explore questions about hardware and software. Call: Dan Meyers, (510)521-3323. [Exp. #99.]

DVPC—Diablo Valley User Group. Meetings: 1st Thurs., 7:30 pm, Corondolet High School, corner of Treat Blvd. and Winton Ave., Concord. SIGs include WordPerfect, Windows, Paradox, Beginner's, Visual Basic, and a new education/entertainment group. Call: (510)943-1637. [Exp. #100.]

EastBay FOG. Meetings: 2nd Wed., 7:30 pm, Apostleship of the Sea, 600 Terminal St., Oakland. All microcomputers, MS-DOS, CP/M. Call: (415)272-9099. [Exp. #97.]

EPIC—Eastbay PC IBM Computer Club. Meetings: 2nd Tues., 7:00 pm, Milpitas Library, 40 N. Milipitas Blvd. Beginners welcome. [Exp. #100.]

Golden Gate Computer Society (GGCS). Meetings: 4th Mon., 7:30 pm, San Rafael Community Center. Call: Steve Greenberg, (415)485-0136. [Exp. #95.]

IBM Technical SIG. Meetings: 2nd Thurs., 7:00 pm, Cubberley Community Center, 4000 Middlefield Rd., Room H-1, Palo Alto. Sponsored by Software Entrepeneurs' Forum. Call: Mike Schmit, (408)244-6826. [Exp. #98.]

Micromate-CP/M-DOS User Group. Meetings: 1st Thurs., 7:30 pm, Chabot Observatory, 4917 Mountain Blvd., Oakland. Call: Ed Miller, (510)376-1611. [Exp. #98.]

NBUG—North Bay User Group. Meetings: 2nd Thurs., 7:30 pm, 330 Rogers St., Vallejo. All computer users welcome. Call: (707)644-9327. BBS: (707)643-NBUG. [Exp. #100.]

PC BasicS: Silicon Valley Computer Society SIG. Meetings: 3rd Mon., 7:30 pm, 847 W. Maude Ave., Sunnyvale. Talks presented by Rich Wingerter of Zip Consulting & Design. Call: (415)326-2435. [Exp. #96.]

PC Programming Team. A club for those IBM users who can write programs for 286, 386, PS/2 PC. Call: (408)270-4596. [Exp. #95.]

Peninsula Computer Club. Meetings: 2nd Thurs., 7:30 pm, Social Room, 222 Laurel St., San Carlos. DOS and CP/M libraries. Call: Larry Welling, (415)593-9981. BBS (415)571-9259. [Exp. #99.]

Pro Players. Club for all games and utilities users. Write: PO Box 84144, Hung Hom Bay Post Office, Hong Kong. [Exp. #95.]

San Francisco Business Computers. Meetings: 4th Thurs., 5:30 pm. For those who use computers in business. Visitors $5. Call: (415)788-5338. [Exp. #95.]

South Bay WordPerfect User Group. Meetings: Monthly, dates vary. Saratoga Community Library. Free, Call: Martin Van Derpool, (408)238-8434. [Exp. #98.]

KNOWLEDGEMAN

Bay Area KnowledgeMan (And Guru) User Group. Meetings: 1st Tues., 6:30 pm., JNZ, Inc., 826 Las Trampas Rd., Lafayette. A forum for discussion and info concerning mdbs products, esp. KnowledgeMan and Guru. Call: (510)947-4878. [Exp. #97.]

LAPTOPS

HPX HP Laptops & Handhelds. Meetings: 2nd Sat., 10:30 am, Sunnyvale. Call: Michael Felsenstein, (415)564-8279. [Exp. #100.]

MACINTOSH

A32 Macintosh User Group. Meetings: 2nd Sat., 10:00 am, GTE Cafeteria, 100 Ferguson Dr., Mountain View. Call: (408)263-0398 days. [Exp. #97.]

BMUG West. Meetings: Last Mon., 6:30 pm, San Francisco Exploratorium. Call: (510)549-BMUG. [Exp. #95.]

BMUG—Berkeley Macintosh User Group. Meetings: Every Thurs., 6:00 pm, Physical Sciences Lecture Hall, UC Berkeley Campus. Call: (510)549-BMUG. [Exp. #95.]

International Macintosh Users Group (IMUG). Meetings: 3rd Thurs., 6:45 pm, location varies. A forum for multilingual computing. Call: Sachiko Berry, (408)862-7724 (weekdays). [Exp. #100.]

Let's Go Macintosh Computer Society. Meetings: 3rd Thurs., 7:00 pm, Skyline Jr. College, Media Center, room 2105, San Bruno. See and try interesting new products, meet other Mac users, hear guest speakers. Call: Fidel Cajulao, (415)221-2995, or Nolan Apostle, (510)947-2523. [Exp. #100.]

Macintosh SIG. Meetings: 3rd Tues., 7:00 pm, Apple Cafeteria, City Center 4, De Anza and Rodrigues, Cupertino. Sponsored by Software Entrepreneurs' Forum. Call: Jeff Cherniss, (408)356-9901. [Exp. #98.]

SMUG (Stanford-Palo Alto Macintosh User Group). Meetings: 1st Mon., 7:00 pm, Syntex Conference Center, 3401 Hillview Ave., Palo Alto. Call: (415)328-4933. [Exp. #99.]

SPC Apple User Group. Meetings: 2nd Wed., 7:30 pm, Fremont Main Public Library. The Society for Prevention of Cruelty to Apple Computers Users Group supports all Apple and

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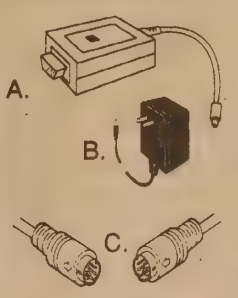

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C. Mac Mini-DIN Cable...6-foot 8-pin Male to Male
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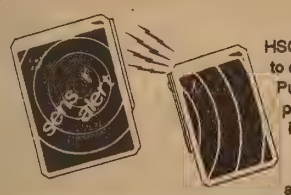
Perestroika Fallout... Soviet Science Collector's Item!

History on the march! Empires crumbling! Eager young scientists being trained for the new world order! We took advantage of the changing world scene to bring to you these unique items that also represent great value...Russian (formerly Soviet) microscopes! The manual calls them training microscopes, we would probably call them student-grade instruments, although they are not toys. They are biological (illuminated from below via mirror) microscopes with two objective lenses (8x, 20x) and three eyepieces (7x, 10x, 20x). The optical quality and workmanship are surprisingly good, given the stories we've heard of Soviet labor woes. The base and hinged armature are handsome painted cast aluminum, and the objective turret and lens bodies are chrome-plated brass. The only assembly required is to screw the eyepiece tube into the frame, and drop in your choice of eyepiece. These units are new, liberally greased (!), packed with a large sachet of dessicant in styrofoam & cardboard, and tied with string! The six-page manual is in fair English, and is duly rubber-stamped with several acceptance dates (1988) and certification numbers on the back. You can think of it as a piece of history, or just a decent, inexpensive microscope, only $69.95! Hurry, limited quantites!

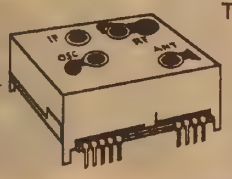
HSC #13065 **$69.95**

An Electronic "Leash" and a Static "Watchdog"...



HSC is able to offer you two alarms that protect you in unusual ways...The first is the Sensor Alert seen at left. This is a pair of small units that are "tuned" to each other and like to be near one another! When they are separated by more than 15 to 30 feet, the receiver emits a beeping tone. Think of the uses! Put the transmitter on your small toddler at the shopping center, keep the receiver on your belt (both units have clips). If Junior wanders off...BEEP! Or put one on your car keys, you will never leave the room without them! The possibilities are endless. The receiver is only 2" x 2.75" x .5", and the transmitter is even smaller, only 1.5" x 2.25". Each unit uses three button cells (included). HSC #13024 only $6.95 for the set. The other alarm is our Static Charge Alarm, seen at right, which will alert you to the presence of static electricity fields in its vicinity. This is important to know when working with CMOS or other sensitive integrated circuits. The unit will beep when one of three selectable levels of static charge is detected, allowing you to take preventive action. Only 4" tall, and uses a 9VDC 300mA adaptor (included) or a 9V battery (not included). Prevent shocking developments! HSC #12846 only $4.95

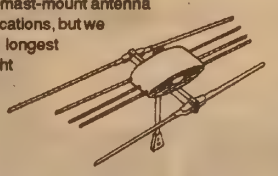
Teeny Tiny Tuner Module for FM!

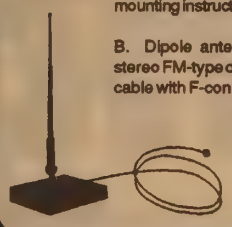


Here is a little module that you won't find anywhere else! This tiny (1" x 1.75" x .5") PC mount package is a varactor tuned FM tuner! Made by Toko (Model #TMC103A) for use on the PC FM Subcarrier adaptors at right. Uses 8 - 12VDC, tunes from 88.3 to 108.1 MHz from 75 ohm antenna input, has 10.7 MHz IF output with Vco output for control feedback to tuning circuitry. We provide a schematic of a suggested application showing pinout of this module with related tuning circuit.
HSC #13101 $4.95 ea. or 10/$39.95

Broadcast FM Antennas

A. Winegard SR-8108 Yagi-type FM/VHF Antenna. Small mast-mount antenna appears to have been designed for attic or drop-ceiling applications, but we can't see any reason not to use it outdoors. 22.5" boom, longest element is 67". It was intended for the data receivers at right in fringe reception areas, but will of course work fine for FM Broadcast reception with your stereo, as well as VHF/TV reception! New with assembly and mounting instructions. HSC#13086 $19.95



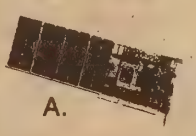


B. Dipole antenna (not shown). Typical 300-ohm stereo FM-type dipole antenna with built-in balun for 75-ohm coax, plus a six-foot coax cable with F-connectors. Works great with FM stereos, VHF TV's, or the units at right!
HSC #13087 $1.95ea. or 10/$15.00

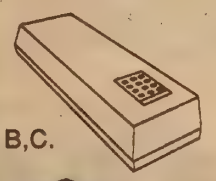
C. FM "Rubber Ducky" Antenna ...18" long with pivot joint on mounting box, 75-ohm coax cable (6 foot) with "F" connector. Could be used in place of "D" above. HSC # 13098 $4.95

FM Computer Network Gear...

Just in...and it goes to show you what things you will find in Silicon Valley's surplus! We have come across a large quantity of components of a nationwide subscription computer network system...software, data and E-mail was sent by means of Broadcast FM Subcarrier and satellite! Perhaps another idea that was ahead of its time, who knows? Anyway, here is a rundown of the pieces, maybe you will think of something to do with them...Note: please don't contact the manufacturer, as they have moved on to other things!


A.

A. "PIN-Desk" IBM/FM Subcarrier Receiver Board. Made by Indesys (similar to illustration). Full length XT style board has shielded box with FM tuner (frequency selected by software), piggyback board with either a 80C31 or two CY2901's. Comes with dipole antenna (see "B" at left) and two diskettes, one marked "Send" and one marked "Receive". This was intended to be part of an FM subcarrier subscription "network" for sending and receiving messages, files and data anywhere in the country! A hacker's bonanza with (depending on revision) NVSRAM's, MAX231, NSC800, RF Parts, etc.!
HSC #13084 $24.95


B,C.

B. "PIN-Mail" Reciever SA-287A, also made by Indesys. This was part of their "PIN" system, and you were supposed to be able to receive E-mail, unattended,via FM Subcarrier with just this box, an antenna (included) and a printer! Or it could be hooked up to a computer via parallel port. Box has numeric keypad on top, plus connectors on back for power, printer, computer and antenna. No diskettes (software is in ROM), just the receiver unit, dipole antenna and power supply.
HSC #13085 $24.95

C. Satellite Data Receiver ST-189, by Indesys. Externally similar to "C" above, but very different inside, unit was designed to be hooked to a small dish antenna and LNB (not included, and we don't have any!) for satellite reception of data and E-mail. Power Supply provided. Many interesting parts inside, including Z-80, NVSRAM, RF Linear parts, 80C31, Sierra Semi SC74008, tuner, etc. Experimenter's delight!
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USER GROUPS

Macintosh computers. Call: Jim Weil, (415)796-7169. [Exp. #95.]

Women's Macintosh User Group. Meetings: 2nd Tues., 7:00 pm, ComputerWare, Palo Alto. Call: Buffy Joseph, (415)792-2840 or Tayna Halepota, (415)949-3936. [Exp. #96.]

MULTIMEDIA

BMUG Multimedia SIG. Meetings: 2nd Mon., 6:00 pm, Call: (510)549-BMUG. [Exp. #95.]

International Interactive Communications Society—IICS. Meetings: 2nd Wed., 7:30 pm, Call: IICS Hotline, (415)328-7318. [Exp. #96.]

Multimedia SIG. Meetings: 1st Thurs., 7:00 pm, Cubberley Community Center, 4000 Middlefield Rd., Palo Alto, Rm. H-1. SIG of Software Entrepreneurs' Forum. Call: Patrick Milligan, (408)257-1547. [Exp. #99.]

Multimedia User Group. Meetings: 1st Wed., 7:00 pm, 600 Townsend St., 1st Fl., San Francisco. A forum to learn about the multimedia industry, get your questions answered, and meet with fellow professionals. Sponsored in part by MacroMind/Paracomp/Authorware. [Exp. #99.]

MUSIC

MuSIG. Meetings: 1st Sun., 2:00 pm. Various locations. Based in Palo Alto. A network of people helping each other learn about computers and music: MIDI, hardware, software, performance, and programming. Call: (415)858-1493. AppleLink: UG0390. [Exp. #99.]

NETWORKING

NetSIG. Meetings: 4th Tues., 7:00 pm, Novell Sunnyvale. Networking SIG for Software Developers. SEF group. Call: Skip Addison, (408)747-4356. [Exp. #97.]

NEURAL NETWORKS

Neural Networks SIG. SIG for Neural Networks and its applications. Call: Kumar, (408)946-5835. [Exp. #98.]

NEXT

BANG—Bay Area NeXT Group. Meetings: 3rd Wed., 7:00 pm, Terman Aud., Stanford. Presentations and lectures. [Exp. #97.]

Berkeley NeXT Users Group. Meetings: 2nd Tues., 7:00 pm, 2055 Center St., Berkeley. Call: Bernt Wahl, (510)644-0139. [Exp. #98.]

NOVELL

Silicon Valley Novell User Group. Meetings: 3rd Wed., 6:30 pm, Coco's, 1305 S. Mary Ave., Sunnyvale. Call: Bill Strouse, (408)739-9081. BBS: (408)739-8753. [Exp. #99.]

PARADOX

Bay Area Paradox User Group—BAPALS. Meetings: 4th Tues., 4:00 pm, SF State University Downtown Campus. Forum for users and developers of all levels. Call: Patricia Hickey, (415)883-1020. [Exp. #96.]

PEN COMPUTING

Pen Systems SIG. Meetings: 4th Wed., 7:00 pm, Cubberley Community Center, Rm. H-1, 400 Middlefield Rd., Palo Alto. SIG of Software Entrepreneurs' Forum. Addresses all issues of interest for developers of pen computing software. Call: Bill McApline, (415)348-2257 or SEF at (415)854-7219. [Exp. #99.]

R:BASE

Peninsula R:Base User Group. Call: Don Whitecar, (415)592-5033. [Exp. #95.]

R:Base Users Group Of Oakland. Meetings: 2nd Thurs., even months, 9:00 am, 519 17th St., Downtown Oakland. Newsletter, tips & techniques, database design issues, and more. Call: (510)451-5316. [Exp. #97.]

SMALLTALK

Northbay Smalltalk/V User Group. Call: (415)362-4283. [Exp. #97.]

SQL

SQL_Forum/Bay Area SQL Database Server User Group. Meetings: Once a month in downtown SF. Oracle, SQL Server, SQLBase, and more. Call: Robert Gentry, DBBS, Inc. (415)583-3000. [Exp. #99.]

TELECOMMUNICATIONS

BMUG Telecom SIG. Meetings: Last Wed., 8:00 pm. How to use your modem, terminal programs, and the BMUG BBS. Call: (510)549-BMUG. [Exp. #95.]

TEXAS INSTRUMENTS

Santa Clara Valley TIPC Group. Meetings: 4th Thurs., 7:00 pm, Magnolia Inn, 176 S. Bernardo, Sunnyvale. Newsletter, library. Call: Thor, (415)386-5237. [Exp. #95.]

TI-99/4A. Meetings: 2nd Sat., Oakland. Call: Fred, (510)530-8335. [Exp. #95.]

THEOS

Theos User Group. Call: (510)785-7355. [Exp. #96.]

UNIX/XENIX

N. Cal UNIX Users. UNIX user group now forming: AT&T UNIX, Coherent, SCO UNIX/XENIX, and LINUX. Write: Just Computers, PO Box 355, Cotati, CA 94931. [Exp. #99.]

UNIX SIG. Meetings: 2nd Tues., DEC, 800 W. El Camino Real, Mountain View. Sponsored by Software Entrepreneurs Forum. Call: Priscilla Rowe, (415)776-0513. [Exp. #98.]

VIDEO TOASTER

Video Toaster User Group. Meetings: Last Thurs., 7:00 pm, HT Electronics, 275 N. Mathilda Ave., Sunnyvale. Special guests, equipment demos, hands-on workshops, plus info/tips on new System 2.0. $4 for non-members. Call: Andrew Timmins, (408)244-9692. [Exp. #99.]

WINDOWS

WinSIG. Meetings: 3rd Thurs., 7:00 pm, Cubberley Community Center, Rm. H-1, 4000 Middlefield Rd., Palo Alto. Windows SIG of the Software Entrepreneurs' Forum. Call: Fran Finnegan, (415)929-7386, or Barbara Cass, (415)854-7219. [Exp. #97.]

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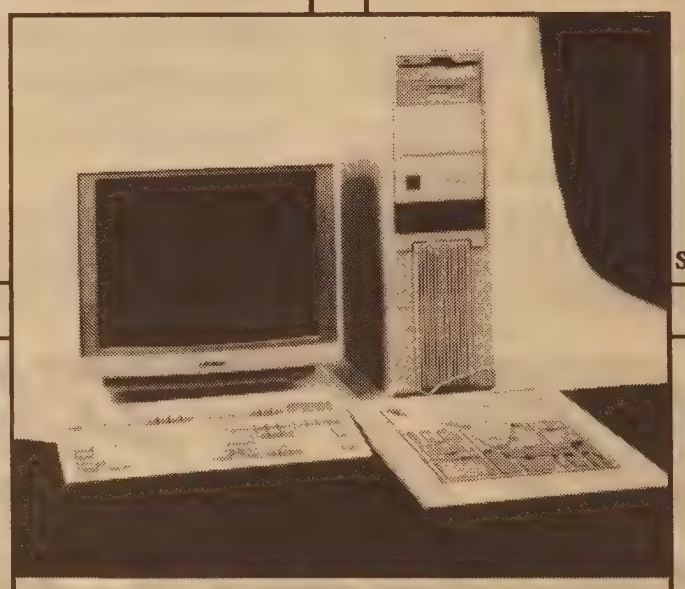

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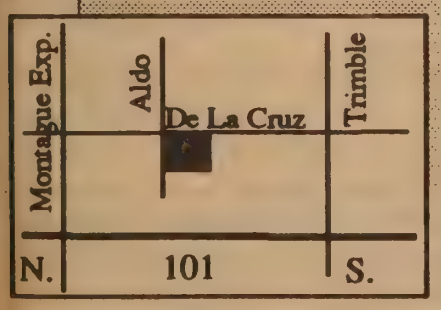

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Continued from page 16

CPU WARS: CYRIX VS. INTEL

Cyrix Corp., best known for its math coprocessors, announced and showed a new chip that will compete with many of Intel's best-selling CPUs. The new Cx486SLC combines the best features of Intel's 486SX with the power-saving features of the 386SLC and puts it in a package that PC manufacturers can use today. Instead of forcing clone makers to redesign their motherboards to accommodate the new chip, Cyrix allows them to simply substitute the new chip for a 25MHz 386SX.

Intel responded as it traditionally does to competitors and sued Cyrix.

The Cx486SLC has an additional feature that took many people by surprise: the price is incredibly low. The chip costs $120 to $130, almost $100 less than Intel's 486SX, while running at approximately the same speed and having power-saving features that Intel's chip lacks. It costs about the same as Intel's 25MHz 386SX but runs 2½ times faster. At the announcement, Zeos, one of the largest mail-order retailers of PCs, announced that it would add systems based on the chip to its line of products within months. Other manufacturers such as Tandon also announced support, and others were seriously considering it for release later this year.

Other than the excellent price, one of the biggest factors affecting the manufacturer's buying decision is the chip's pin-compatibility with Intel's 386SX. With competition getting tighter and the recession affecting all dealers, many manufacturers have been cutting back on their research and design budgets. A chip that can be plopped right into an existing design has a huge advantage over one that takes even a small redesign. Although the market for Intel's 486SX has been small due to its high price, Cyrix is expected to make significant inroads in both desktops and portables.

Now that the 386SX portable market is completely saturated and the 386 portable market will be within a year, manufacturers can leapfrog into the 486SX market easily with the Cyrix chip. The low-power design even lets them reduce the size of the battery, or at least claim longer times between recharging.

Intel's lawsuit against Cyrix claims that Cyrix infringes on four of Intel's patents. Cyrix's main defense is that the chip is actually being manufactured by chip giant Texas Instruments (TI), who has a patent cross-licensing agreement with Intel that could nullify the lawsuit. It is likely that TI will join Cyrix's side in the case, thereby pitting Intel against a company that has had remarkably good luck in patent lawsuits over the last decade. Intel recently sued Chips and Technologies (C&T) for its 386-compatible CPU and TI joined on C&T's side as its foundry, using the same arguments that are expected in the suit against Cyrix.

In the C&T case, Intel asked for a temporary restraining order against C&T, TI asked to intervene, and the judge in that case allowed TI to join. TI argued that it has a broad cross-licensing agreement with Intel and that agreement gives it the right to fabricate the CPUs for C&T.

That line of argument will be tested in a few cases, possibly within the next few months. In the past, Intel has sued Cyrix over patents in Cyrix's math coprocessors. Cyrix says that it is protected by the patent cross-license of its foundry for those coprocessors. That case, plus the two cases in which TI is expected to intervene, may quickly open the CPU market and significantly damage Intel's monopoly on CPUs for PCs.

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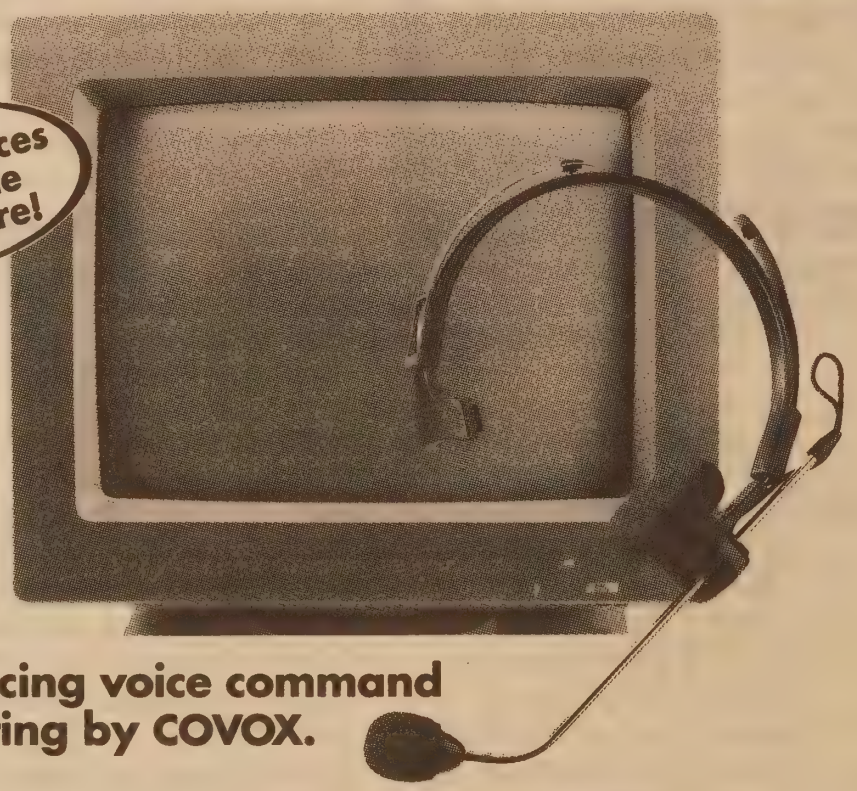

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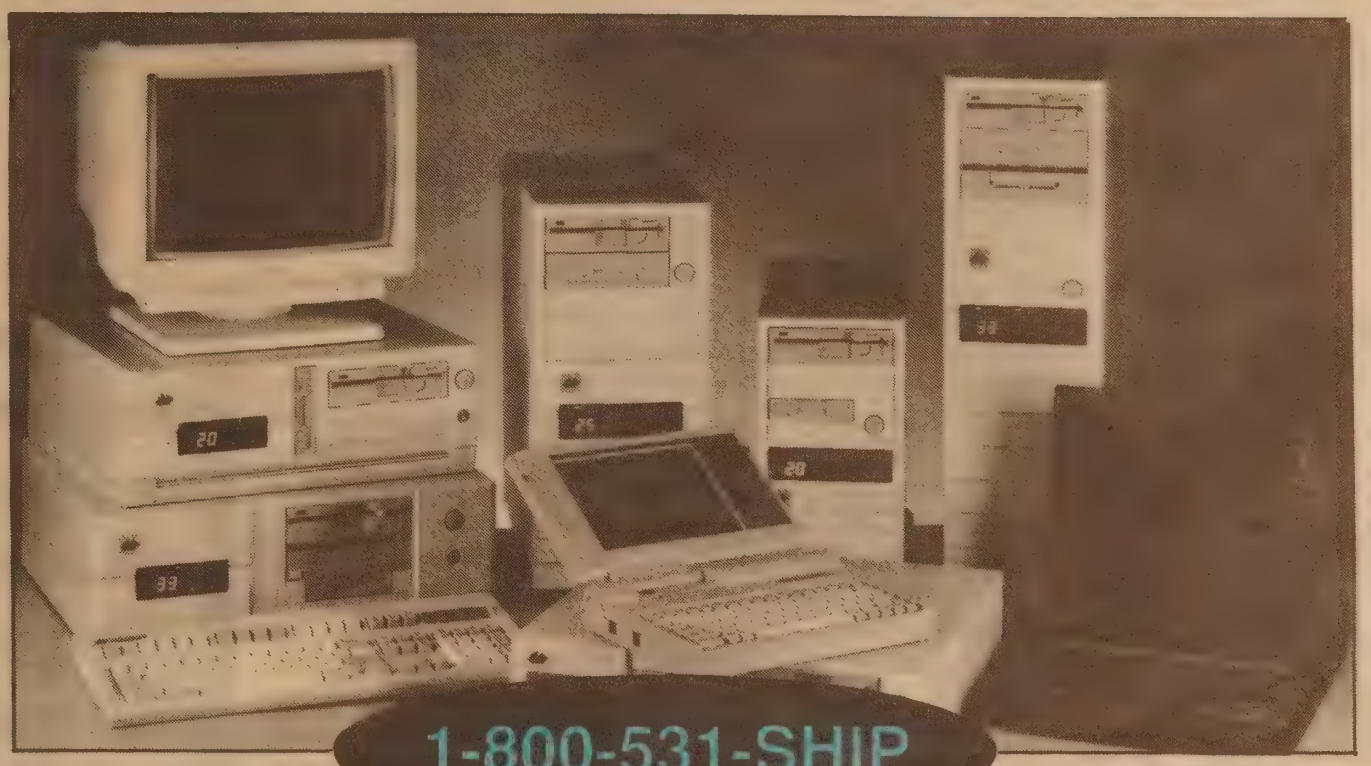

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•2 MB RAM
•3.5" 1.44 MB Floppy
•40 (STANDARD) 60/80/120MB HARD DRIVE
•640X480 VGA w/32 SHADES OF GRAY
•(1) SERIAL, (1) PARALLEL PORTS
•MS-DOS 5.0 w/GW BASI INSTALLED
•DURABLE CARRYING CASE

w/60 MB $1595
w/80 MB $1695
w/120 MB $1795

•INTEL 386™SX 20 MHz CPU
•FCC CLASS B, UL, TUV, & CSA APPROVED
•14.7 lbs.
•12.7" x 16.7" x 3.1"
•1 MB RAM
•40 (STANDARD) 80/120/240MB HARD DRIVES
•640X480 VGA w/16 SHADES OF GRAY
•(2) SERIAL, (1) PARALLEL PORTS
•MS-DOS 5.0 w/GW BASIC INSTALLED
•DURABLE CARRYING CASE

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w/120 MB $2095
w/240 MB $2395

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•INTEL 486/386™SX 20 MHz CPU
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•1.2MB 5.25" FLOPPY DRIVE
•1.44MB 3.5" FLOPPY DRIVE
•40MB IDE HARD DISK
•16 BIT COLOR VGA CARD
•14" VGA COLOR MONITOR
•101-KEY ENHANCED KEYBOARD
•MS-DOS 5.0

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•486/50 EISA W/256K CACHE
•(2) SERIAL,(1) PARALLEL PORTS
•1.2 MB 5.25" FLOPPY DRIVE
•1.44 MB 3.5" FLOPPY DRIVE
•340 MB SCSI HARD DRIVE
•250 MB TAPE BACK-UP
•SCSI CONTROLLER W/1 MB
•MONO MONITOR & VIDEO CARD
•TOWER CASE W/250W POWER SUPPLY
•MS DOS 5.0

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•64K CACHE MEMORY
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•DUAL FLOPPY/HARD DISK CONTROLLER
•1.2MB 5.25" FLOPPY DRIVE
•1.44 MB 3.5" FLOPPY DRIVE
•200 MB IDE 15ms HARD DRIVE
•16 BIT SVGA CARD w/1 MB
•14" 1024x768 SVGA MONITOR
•101-KEY ENHANCED KEYBOARD
•MS-DOS 5.0

•INTEL 386™ 25/33 MHz CPU
• SAME CONFIGURATION AS ABOVE
•120MB IDE HARD DRIVE

486/50 EISA/ISA .....
486/33 EISA/ISA .....
386/33 .....
386/25 NON-CACHE .....

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DEC GETS SERIOUS ABOUT PCS

If you read the trade journals, you can't help but notice that Digital Equipment Corporation (DEC) had jumped into the PC market in a big way, with much more vigor than previous attempts.

In the past few months, DEC has been taking out multi-page ads in most national PC magazines touting its line of higher-priced and powerful PCs. It has also stepped up its telemarketing to its traditional minicomputer clients. The prices offered by DEC are near those of Compaq and Northgate, and are easily beaten by other mail-order manufacturers and most local PC stores.

To bolster its position in the PC market, DEC recently bought Berkeley-based 800 Software, a major software distributor with a large corporate clientele base. 800 Software will continue to operate as it does now but will be a wholly owned subsidiary of DEC. As such, it will allow DEC to offer software and software support to its corporate clients at the same time it offers them deals on its PCs.

DEC says that its new move has increased its market share tenfold. Many more corporations will appreciate a one-stop shopping venue such as DEC, particularly ones who already spend millions of dollars a year on DEC minicomputers. DEC says that it will keep the two hundred employees of 800 Software in their current location and will add much more significant ties to the company.

NEW OPERATING SYSTEMS SHIP—USERS START THIS YEAR'S MUDDLE

Stay with MS-DOS? Upgrade from Windows 3.0 to Windows 3.1? Try out OS/2? The choices have just gotten more difficult with the long-awaited releases of Microsoft's Windows 3.1 and IBM's OS/2 2.0.

Both companies made their self-imposed deadlines of early April after both missing their previous deadlines at the end of last year. COMDEX in Chicago was the first public view of these two competing operating systems, and many people came away feeling that both were worthy of consideration, regardless of the fact that Windows 3.1 will easily outsell OS/2 2.0.

For months, industry pundits have questioned why anyone would want to use OS/2 if Windows 3.1 lived up to expectations. With both systems now available, many are backtracking on their criticism of OS/2 and are praising it for its faster execution of many Windows programs. Windows 3.1 runs faster than v3.0, particularly on systems with slow CPUs and 2MB of memory. OS/2 requires faster CPUs and more RAM for a minimum system, but rewards the user with a more robust and predictable system than Windows 3.1. Many corporate buyers are saying that they will use OS/2 2.0 instead of Windows 3.1, despite the gloom-and-doom in the press, due to its technical superiority.

Many people are also worried about Microsoft's commitment to Windows 3.1 with so much emphasis being put on Windows NT. Windows NT will be a higher-end operating system with many features that will make it far superior to Windows 3.1. In the past, when Microsoft has released such vastly improved products, it has dropped support for the older, weaker versions. Like OS/2 2.0, Windows NT will require a faster CPU and more memory than Windows 3.1 and will offer a more stable system with many advances. Many people who have previewed Windows NT say that it has pretty much the same advantages of OS/2 2.0. Microsoft claims that it will release Windows NT by the end of this year, but beta testers who have tested other Microsoft products are skeptical.

Many people who have previewed Windows NT say that it has pretty much the same advantages of OS/2 2.0.

Where does that leave PC users? Many who have bought Windows 3.0 never use it, or only use it to run one or two Windows programs. Those people probably don't need to upgrade to Windows 3.1 or OS/2 2.0 or Windows NT because their current system works just fine. Intermediate and power users will have the most difficult choices, particularly because all three operating systems run both MS-DOS and Windows programs. If these people are also interested in UNIX, their choices will be made more difficult in the coming months as SunSoft releases Solaris 2.0 for the PC.

The fragmentation in the operating system market may help end-users—after they decide which to buy—because it will force all the manufacturers to include all of the features of each other's products. ■

Technology News From Japan

(Excerpted from the weekly news digest of Japan Marketing Group, 400 Groveland Ave., Suite 312, Minneapolis, MN 55403, 612/871-7889. JMG covers products and events in the Japanese computer industry.)

➤**IBM Japan** has secured a $74.6 million order from Sanwa Bank for an overseas operation computer system. Due to begin service in March 1993, the Sanwa "Global System" will include twelve IBM mainframes at six computer centers worldwide, plus 550 RS/6000 workstations and six hundred PS/55s at fifty offices in twenty-seven countries.

➤**Microsoft Japan** has announced plans to ship Windows 3.1 this summer.

➤**ADVANET,** a Tokyo networking company, is shipping the XPASS-MC, an ISDN file transfer device for Macintosh computers. It allows NTT's INS Net64 ISDN service to be used for rapid, accurate transfer of large files such as CAD/CAM images between hosts and online terminals. The device also allows transfer of files in mixed-platform environments.

➤**NCR Japan** is shipping a 32-bit Japanese-language pen-input PC. The NCR 3125 Pen computer runs MS-DOS 5.0 and PenDOS, an operating system developed by US-based Communication Intelligence, and supports the Just Systems ATOK kana-kanji conversion function. Later versions of the hardware will also implement both PenWindows from Microsoft and PenPoint from GO.

Monthly Specials!!

MICRO-L ISA 486-50 CACHE (Symphony) $2895

- Intel 80486-50MHz Processor
- AMI BIOS, Symphony™ Chipset, Dallas DS1287 real-time clock (w/10-year warranty) • 256k Cache SRAM exp. to 1MB
- 8MB RAM 60ns expandable to 32MB onboard
- 1.2MB & 1.44MB Floppy Disk Drives (TEAC)
- 210MB, 15ms, 64k Cache IDE HDD • IDE HD/FD Controller
- Diamond Stealth1280 Card, 1MB VRAM,16-bit VGA card, Hi Sierra color (up to 25 times faster than standard VGA)
- 14" Super Multiscan,1024x768,non-int.,0.28dp,(Relisys-1422)
- 1 Parallel / 2 Serial Ports • Keytronics 101 Keyboard (USA)
- Mid Tower case (Heavy duty), 230W UL P/S & digital display
- MS-DOS 5.0 • MS-Windows 3.0 and MS compatible mouse
- **OPTION: Sony CPD 1304S/1604 monitor - add $265/675**
- **OPTION: Nanao 9080I /T560I monitor - add $735/1595**
- **OPTION: Full Tower - 10-bays, 275W P/S - add $75**

MICRO-L ISA 486-33 CACHE (Symphony) $2035

- Intel 80486-33MHz Processor - Upgradable to 50MHz; Socket for removable crystal allows for CPU changes
- AMI BIOS, Symphony™ Chipset, Dallas DS1287 real-time clock(10yr warranty) • 256k Cache SRAM expandable to 1MB
- 4MB RAM 70ns exp. to 32MB onboard
- 1.2MB and 1.44MB Floppy Disk Drives (TEAC)
- 130MB, 15ms, 64k Cache IDE HDD • IDE HD/FD Controller
- SpeedStarPlus, 1MB,16-bit VGA card, Hi Sierra color
- 14" Super Multiscan,1024x768,non-int.,0.28dp,(Relisys-1422)
- 1 Parallel / 2 Serial ports • Keytronics 101 Keyboard (USA)
- Mid Tower case (Heavy duty), 230W UL P/S & digital display
- MS-DOS 5.0 • MS-Windows 3.0 and MS compatible mouse
- **OPTION: 210MB IDE HDD - add $260**
- **OPTION: Sony CPD-1304 monitor add - $265**
- **OPTION: Diamond Stealth1280 Hi Color card -$140**

MICRO-L 386-33 (CACHE / Symphony) $1595

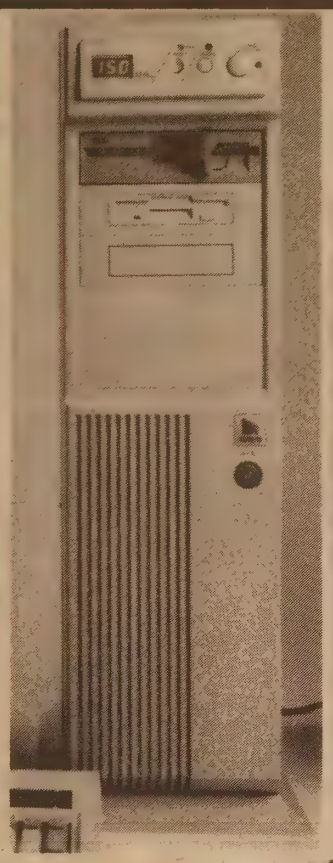
- Intel 80386-33MHz CPU - Upgradable to 40MHz; Socket for removable crystal allows for CPU changes
- AMI BIOS, Symphony™ Chipset, Dallas DS1287 real-time clock (w/10 year warranty)
- 64k Cache SRAM exp. to 1MB onboard (Option: 256k - Cache - add $65) • 4MB RAM 70ns exp. to 32MB onboard
- 130MB, 15ms IDE Hard Disk Drive • HDD/FDD controller
- 1.2 & 1.44MB FDDs(TEAC) • 1Parallel / 2Serial / Game ports
- 14" Super Multi-scan, non-int., 1024 x 768, 0.28dp (Relisys RE-1422) • 16-bit VGA Card with 1MB onboard
- Deluxe Baby Case with 200W UL power supply ,6-bays
- Keytronics 101 Keybd (USA) • MS-DOS 5.0
- MS-Windows 3.0 and MS compatible mouse
- **OPTION: 386-40 SVGA system - add $45**
- **OPTION: Mid-Tower - add $60**

MICRO-L 386-25 (Symphony) $1395

- Intel 80386-25MHz Processor - Upgrades to 33MHz/40MHz; Socket for removable crystal allows for CPU changes
- AMI BIOS, Symphony™ Chipset, Dallas DS1287 real-time clock(10yr warranty) • 4MB RAM 70ns exp. to 32MB onboard
- 80MB, 17ms IDE Hard Disk Drive • HDD/FDD controller
- 1.2 & 1.44MB FDDs(TEAC) • 1Parallel/ 2Serial / 1Game ports
- 16-bit VGA Card with 1MB onboard (Trident)
- 14" Super VGA, 1024 x 768, 0.28dp (Relisys-1420)
- Deluxe Baby Case with 200W UL power supply ,6-bays
- Keytronics 101 Keybd (USA) • MS-DOS 5.0
- MS-Windows 3.0 and MS compatible mouse
- **OPTION: 386-33 SVGA system - add $35**
- **OPTION: 386-40 SVGA system - add $65**
- **OPTION: Mid-Tower - add $60**

MICRO-L 386-SX/20 SVGA $1195

- Intel 80386-SX/20MHz Processor • AMI BIOS
- 2MB RAM expandable to 8MB onboard
- 1.2 & 1.44MB FDDs(TEAC) • 1Parallel/ 2Serial / 1Game ports
- 40MB IDE Hard Disk Drive • HDD/FDD controller
- 16-bit VGA card with 512K onboard (Flicker Free)
- 14" SVGA Monitor, 1024 x 768, 0.28dp (Relisys RE-1420)
- Keytronics 101 Keyboard (USA) • MS-DOS 5.0
- MS Window 3.0 and MS compatible mouse
- Deluxe Baby Case with 200W UL power supply ,6-bays
- **OPTION: 386SX-25 64K Cache, SVGA system - add $75**
- **OPTION: 80MB IDE HDD - add $110**



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AT & T	Clemsen University	U.S. Veterans Hospital Admin. Ctr.	
N.A.S.A.	Xerox Eastman Kodak	Lawrence Livermore Laboratories	
Lockheed Missile/Space Engineering		...and the list goes on and on...	

Standard System Features:

(*Unless specified differently in Specials)

- Motherboard - Intel CPU
- 4MB 70ns RAM on-board
- Math co-processor socket
- 1.2MB and 1.44MB FDs(Teac)
- Dual IDE HDD/FDD controller
- 2 serial/1 parallel/1 game ports
- 101Keytronics keyboard
- Desktop case w 200W UL / PS

OPTIONS:.....Mid-Tower add-$60
..... Full-Tower add-$100

MICRO-L™ SYSTEMS: (Prices below do not include HDD, monitor / card)

486-33 EISAII w/256k cache (Micronics MB) $1,795
486-50 ISA w/256k cache (MCI/Symphony) $1,395
486-33 ISA w/256k cache (MCI/Symphony) upgradable to 50MHz $1,065
486SX/20 w/64k cache (Symphony) upgradable to 33MHz/50MHz $825
386-33 w/64k cache (Symphony) upgradable to 40MHz.....$755
386-25 (Symphony) upgradable to 33MHz/40MHz $695
386-SX20 or 386-SX16 ..... $625/595
MICRO-L Notebook 386-SX-V20 Vanda , 2MB RAM, 40MB HDD, 1.44 FDD, 1P & 2S ports, 32 Grey scale VGA, 6.2lbs.....$1485

MOTHERBOARDS

486-50 EISAII 256K cache/Micronics	$1795
486-33 EISAII 256K cache/Micronics	$1295

MICRO-L™ Symphony Spec:

- Symphony Chipset - CPU socket accepts 486-33/50 & 486SX-20
- AMI BIOS & Weitek 4167 math-coprocessor
- Up to 32MB SIMM RAM on-board
- Removable crystal allows for CPU changes
- UP to 1MB direct map cache
- Dallas DS1287 real-time clock (10yr warranty)
- Seven 16-bit and One 8-bit expansiosn slots
- Baby size board: 8.5in. x 13in.)

486-50 ISA 256K cache, Symphony	$845
486-33 AT 256K cache, Symphony	$595
486-SX/20 64K cache, Symphony	$310
386-33/40 64K cache, Symphony	$250/265
386-25/33 Symphony	$215/240
386-SX25 64k cache	$225
386-SX16 /20	$160/175

MONITORS

Hitachi CM-2085, VGA, 20"	$1625
IDEK VGA 5217(17")/5221(21")	$985/2395
Nanao 16" VGA 1024x768 9080i	$1030
Nanao 20" VGA 1024x768 T560i	$1865
Nanao 20" VGA 1280x1024 9400i	$2065
NEC 3FGX/4FG/5FG	$650/735/1435
Relisys S Multiscan,1024x768 RE-1420	$290
Relisys S Multiscan,NI,1024x768 RE-1422	$330
Sony 16" SMultiscan, CPD 1604S	$995
ViewSonic V6/V7 VGA	$345/1040
ATI UltraGraphic VGA 1MB	$615
Diamond Stealth 1280, 1MB VRAM	$290
Orchid ProD IIs 1MB., w/Hi Sierra	$178
Orchid Fahrenheit 1280, 1MB	$280
SpeedStar+ VGA 1MB, w/Hi Sierra	$149
Vermont Dynamaster VGA 1MB	$345

HARD DRIVES

Maxtor MXT-7080A 81MB IDE	$295
Maxtor MXT-7120A/S 130MB	$340
Maxtor LXT-213A 213MB IDE	$365
Maxtor LXT-340A 340MB IDE	$915
Maxtor XT-8380SH 380MB SCSI	$1075
Maxtor XT-8760SH 768MB	$1345
Maxtor 1.02 GB/1.47GB SCSI	$1895/2295
Conner CP-3204 200MB	$590
Quantum ProDr120AT 120MB,15ms	$375
Quantum ProDr240A/S 210MB,14ms	$615
Adaptec 1542B - Kit SCSI Cntrlr FD/HD	$260

MISCELLANEOUS

3-COM 3C503 Etherlink	$185
Colorado DJ-10/DJ-20 Tape BK	$230/285
American Smart UPS 600LS/400LS	$415/335
Summa Sketch II+ 12"x12" Digitizer	$325
Kurta IS1212-ADB 12" x 12" tablet	$345
US Robotics Sport 9600 int./ext.	$345/375
US Robotics 9600 Courier HST ext.	$555
FAX modem 9600 send/recv/software	$95

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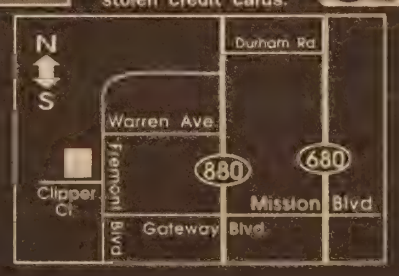

Computer Stocks Fall Sharply During Month Ended April 10

It was a brutal month for holders of shares in computer makers as concern over increased competition, decreased earnings, and lackluster economic recovery combined to hammer these shares during the trading session ended April 10. For the period, the MicroTimes Stock Index, which tracks the cumulative performance of the shares in the accompanying index, lost 321.30 points before finally coming to rest at a mark of 3566.89. In other words, the average percentage loss for the shares in our index was a hefty 8.26%.

Nationally the news was slightly better during the period as a late-month cut in interest rates by the Federal Reserve outweighed the effects of a sliding Japanese stock market. For the month, the Standard & Poor's 500 Stock Index lost a scant 0.38% while the Dow Jones Industrial Average gained 0.60% to close at a mark of 3255.37.

Turning to the shares in our index we see that many issues would have been happy with losing only 8.2% as investors reacted sharply to surprising earnings reports, and scaled back earnings predictions.

Digital Equipment, for example, lost $14.63, or a sizable 24.43%, before coming to rest at a 52-week low of $45.25. The decline came after the firm announced third-quarter losses of $2.36 a share, significantly higher than the $1.00 loss analysts had been predicting.

Intel also felt the effects of poor earnings, as well as increased investor nervousness over the company's declining market-share, as its shares fell $12.88 to a closing price of $51.13. During the month, the firm announced first-quarter earnings of $0.86 a share, down from $0.95 during the same period a year ago. Intel cited reserves for patent infringement settlements with Hughes Aircraft and Advanced Micro Devices as the reason for the lower earnings.

Concern over earnings was enough to send Adobe's shares sliding to their lowest point in 52 weeks, as the company's stock price lost $12.13, or 23.32%, before coming to rest at $39.88. The drop came as Wall Street analysts scaled back their earnings estimates for the firm.

Increased competition in the form of Microsoft's acquisition of closely held Fox Software, is the reason most Wall Street analysts cited for downgrading their recommendations on Borland International. Whatever the reason, investors took the recommendations to heart as Borland led all dollar-losers during the period, slipping $15.75 before finally ending matters at a price of $52.00.

EXCH.	COMPANY		TICKER SYMBOL	CLOSING PRICE 03/13/92	CLOSING PRICE 04/10/92	NET CHANGE IN PERIOD	PERCENT CHANGE IN PERIOD	PRICE/ EARNINGS RATIO	ANNUAL DIVIDEND RATE	ANNUAL DIVIDEND YIELD	52 WEEK HIGH	52 WEEK LOW
SOFTWARE												
OTC	Adobe	(L)	ADBE	52.00	39.88	-12.13	-23.32	18	0.32	0.80	68.50	39.25
OTC	Aldus	(L)	ALDC	28.00	22.38	-5.63	-20.09	15	0.00	0.00	57.75	21.50
OTC	Autodesk		ACAD	29.75	34.50	4.75	15.97	15	0.48	1.39	62.25	23.25
OTC	Borland		BORL	67.75	52.00	-15.75	-23.25		0.00	0.00	86.75	39.50
OTC	Informix		IFMX	26.00	29.00	3.00	11.54	36	0.00	0.00	33.00	5.25
OTC	Lotus		LOTS	38.63	33.25	-5.38	-13.92	34	0.00	0.00	40.75	18.00
OTC	Microsoft		MSFT	121.00	116.00	-5.00	-4.13	38	0.00	0.00	133.25	60.50
OTC	Novell		NOVL	58.75	54.13	-4.63	-7.87	44	0.00	0.00	65.00	22.63
OTC	Oracle		ORCL	17.00	13.25	-3.75	-22.06	47	0.00	0.00	21.13	7.00
OTC	Software Publishing		SPCO	24.63	18.00	-6.63	-26.90		0.00	0.00	26.25	12.50
OTC	Symantec		SYMC	44.25	43.00	-1.25	-2.82	58	0.00	0.00	51.00	19.50
HARDWARE												
OTC	Apple		AAPL	63.13	55.50	-7.63	-12.08	21	0.48	0.86	70.00	40.25
OTC	AST Research		ASTA	17.25	16.25	-1.00	-5.80	7	0.00	0.00	32.25	14.50
NYS	Commodore		CBU	14.38	13.88	-0.50	-3.48	8	0.00	0.00	20.00	10.13
NYS	Compaq		CPQ	28.75	24.88	-3.88	-13.48	17	0.00	0.00	65.00	22.13
NYS	Digital Equipment	(L)	DEC	59.88	45.25	-14.63	-24.43		0.00	0.00	74.25	45.25
OTC	Dell	(H)	DELL	23.67	25.63	1.96	8.27	18	0.00	0.00	27.34	13.50
NYS	Hewlett-Packard	(H)	HWP	77.38	75.00	-2.38	-3.07	22	0.80	1.07	85.00	44.63
NYS	IBM	(L)	IBM	89.63	86.00	-3.63	-4.04		4.84	5.63	110.75	81.63
NYS	Silicon Graphics		SGI	21.25	18.00	-3.25	-15.29	27	0.00	0.00	29.75	13.25
OTC	Sun Microsystems		SUNW	32.50	27.75	-4.75	-14.62	14	0.00	0.00	38.63	20.75
NYS	Xerox		XRX	75.25	72.25	-3.00	-3.99	18	3.00	4.15	82.25	51.50
NYS	Tandy		TAN	29.75	27.63	-2.13	-7.14	13	0.60	2.17	36.50	23.38
CPUs												
NYS	Advanced Micro Device		AMD	17.88	16.63	-1.25	-6.99	7	0.00	0.00	21.50	8.38
OTC	Intel		INTC	64.00	51.13	-12.88	-20.12	13	0.00	0.00	68.75	38.50
NYS	LSI Logic		LSI	8.00	7.25	-0.75	-9.38	38	0.00	0.00	12.50	6.50
OTC	MIPS		MIPS	13.00	10.63	-2.38	-18.27		0.00	0.00	20.63	7.88
NYS	Motorola		MOT	75.38	74.13	-1.25	-1.66	22	0.76	1.03	82.50	54.00
COMMUNICATIONS												
NYS	AT&T	(H)	T	38.25	41.88	3.63	9.48	107	1.32	3.15	42.13	32.88
NYS	BellSouth Corp.	(L)	BLS	45.38	44.38	-1.00	-2.20	14	2.76	6.22	53.00	43.38
OTC	MCI		MCIC	32.75	31.25	-1.50	-4.58	16	0.10	0.32	36.13	25.25
NYS	Northern Telecom		NT	46.13	44.75	-1.38	-2.98	22	0.32	0.72	49.25	32.50
NYS	Pacific Telesis	(L)	PAC	38.75	38.75	0.00	0.00	15	2.16	5.57	45.00	36.88

KEY: NYS=NEW YORK • ASE=AMERICAN • OTC=OVER THE COUNTER • (H)=NEW HIGH REACHED IN PERIOD • (L)=NEW LOW REACHED IN PERIOD • (s)=STOCK SPLIT

MARKET DIARY:

		MOST ACTIVE ISSUES:		
ADVANCES	4	LARGEST DOLLAR GAINER	Autodesk	$4.75
DECLINES	28	LARGEST DOLLAR LOSER	Borland	$ -15.75
UNCHANGED	1			
NEW HIGHS	3	LARGEST PERCENTAGE GAINER	Autodesk	15.97%
NEW LOWS	6	LARGEST PERCENTAGE LOSER	Software Publishing	-26.90 %

CLOSING QUOTES FOR CHART:

	CLOSE 03/13/92	CLOSE 04/10/92	NET CHANGE IN MONTH	PERCENT CHANGE IN MONTH
MICROTIMES STOCK INDEX	3888.19	3566.89	-321.30	-8.26
DOW JONES INDUSTRIAL AVERAGE	3235.91	3255.37	19.46	0.60
STANDARD & POOR'S 500 STOCK INDEX	405.84	404.29	-1.55	-0.38
N.Y.S.E. COMPOSITE	224.30	223.27	-1.03	-0.46
NASDAQ COMPOSITE	618.62	584.24	-34.38	-5.56

DATE	MICRO TIMES	DOW JONES
08/29/91	3265.70	3049.64
09/27/91	3216.77	3006.04
10/25/91	3223.68	3004.92
12/12/91	3254.85	2895.13
01/20/92	3961.41	3254.03
02/14/92	3984.10	3245.97
03/13/92	3888.19	3235.91
04/10/92	3566.89	3255.37

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April 27, 1992

Mr. Ken Marson
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Dear Ken,

I'm writing a brief note to let you know the success we are having with our MicroTimes advertisement. We've been with MicroTimes since the opening of our sales office two years ago and are literally overwhelmed with the considerable amount of calls immediately following the release of an issue. We have placed ads with a competing publication, but alas, the responses we were getting from the other publication could not match the calls we were receiving through MicroTimes.

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Patrick Yuen, President
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Continued from page 96

programmers. We weren't Xerox PARC researcher-type guys. We were guys that worked on these big operating systems that live for twenty-five or thirty years, out in the field, fixing bugs.

We were *maintenance* programmers. And the culture of the maintenance programmer is very different than the culture of the research guy. The maintenance programmer works directly with the customer. Maintenance programmers recognize that someday they're going to retire and their children will be maintenance programmers, who are going to have to inherit this thing.

But really, it's more of an ethos that is that of engineering rather than that of a writer or of a moviemaker or something. It's recognizing that the thing has a life cycle, that there are lots of people involved in it, that if you write something and don't adequately document it so somebody can pick it up, you're not doing your job. You're fundamentally not doing your job.

And we try to take that approach to everything we do. We certainly rely on individual talented people, and one of the things that's unique about this business is that there are individuals who are hundreds of times more productive than other people who are productively employed in this business. When you find those superstars, great. But you can't build a company out of all superheroes, because there aren't enough superheroes to go around.

And besides, they don't necessarily get along when you get them.

[*laughs*] That's right.

If you're fulfilling the needs of real customers, you have to be able to do it with a product cycle that fits the customer's expectations. You have to meet the needs of the marketplace, you have to evolve onto the new hardware that's coming along. And that means, in a large developed market like the market for AutoCAD or for spreadsheets or for word processors, you have large teams of people doing lots of things at once, doing lots of things in parallel. And that's management. You need to have management that understands how to run big engineering projects.

It's not the most exciting thing in the world to talk about, but if you want to be in this business you've got to know how to do it. You can't design and manufacture cars with one bright guy that knows a lot about cars. It takes a lot of people in that cycle, all the way through. And that's the way we have to build software.

It's a perspective you have to have. Particularly as the user expectations grow. When you go into Egghead, and pay $35 for a piece of software, you expect to have something that's got a large number of man-years of work in it. I may say your expectations are ridiculous, [*laughs*] but they're yours, and you've got the money, so I better conform.

I think part of what's happened is that the kinds of things we vendors had the audacity of selling for money four and five years ago are what you expect out of a public domain program now. So if we intend to go on asking people to pay money for this stuff, we're going to have to really give them something that's worth it.

And that's a big job. When you talk about the big CAD systems, the mainframe CAD systems, those are systems that are fifty times bigger than AutoCAD. We have a long way to go just in that line, and our users can use every bit of that capability just as soon as we can get it to them.

But those are big engineering projects that have to be done in a rigorously professional manner, or you're going to fail. If you talk about building a system that has conceptual design on the front end, drafting in the middle, manufacturing on the back end, it integrates to your manufacturing control system, it complies with the ISO 9000 specs for quality control that are being enforced around the world now, that communicates to other CAD systems in the PDES product description language that is now becoming standardized—you end up with a couple hundred people working on these things, and all the pieces, and they've got to plug together when you put it in a customer location.

How do you avoid the design-by-committee problem when you do that?

Well, at some level I'm not convinced there's a problem with that. You certainly look for inspiration, but also you have to get there from here. In the engineering world, many things are designed by committees whether you like it or not. The IGES standard—you can't sell a CAD system unless you can read and write IGES—was designed by a committee. You may be on the committee, but all your competitors are on the committee, and government and industry. People are on the committee, and they hand you this thing and then you go and implement it. We don't operate in a domain that affords us unlimited freedom. ASCII was designed by a committee. Unicode was designed by a committee. These are standards that you have to conform to.

When you go to build your own application, I think you avoid that by having those Wild Talents, and by doing a lot of prototyping, getting a feel for how something is really going to look, and then go out to the customers. Companies that aren't out there with the customers are doomed, I think. The customers have a lot more wisdom—when you've got half a million customers, there's a lot more cubic centimeters of neurons firing outside the organization than inside the organization. And it's up to you to really be out there communicating with the customers, looking at what they're doing and learning from them.

Some people would have it that being engineering-driven and being customer-driven are diametrically opposed.

I think that's nonsense. I think that any business that isn't interested in meeting the needs of people in the real world is somebody's personal playpen and not a business. When I say meeting the needs, I mean meeting the needs of the people that are currently buying your products and the people that aren't buying them yet, or aren't buying the stuff that you aren't building yet.

You've got to be customer-oriented. I think every business is a service business. I believe that firmly, that fundamentally when you ask somebody to give you money, you have to be giving that person something that is more valuable to them than money.

Think about that. That's the decision you make. Even when you go into the video store, you're saying "Being able to watch *Terminator 2* tonight is worth more to me than having $1.50 in my pocket that I can do anything I want with."

That's what you're doing. And in the software business, it's even more of a service business, because when you're buying a piece of software, you're not buying something that's disposable. You're buying, generally, a commitment to something that you expect to be updated and upgraded, that you expect to preserve the investment you make in hammering parts of your life into this thing.

It seems that a lot of things you're talking about—long-term

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strategy, diversification, keeping your edge—pretty much flies in the face of the way business is done in the United States.

That's why I don't do business in the United States any more. [*laughs*]

So do you think there's hope for business in the United States?

I am uninterested and uneducated in the issues of politics.

I was less interested in politics than in what I've heard coming from the mouths of Mitch Kapor and John Roach and others, that the obsession with the quarterly bottom line is killing American business. Do you find that to be true, or not?

I guess that has killed a lot of companies. But I think it's been, perhaps, used as an excuse by other companies for killing themselves in other ways.

Meeting quarterly figures is an expectation of the United States public stock markets. But the responsibility for the long-term destiny of the company does not rest with the Wall Street investors, it rests with the senior management of the company. If the company has an asset value of a billion dollars, say, like Autodesk used to, and its management squanders that by focusing on the next ninety days, they are not doing their job.

There's a point at which you have to go to Wall Street, and say, "We're going to disappoint you. Because if we don't invest in this business, we are not doing our job as management. We're abdicating our fiduciary duty to the shareholders, to invest in the long-term future of this company."

If you look at companies, you will find times when IBM has gone to Wall Street and said, "We are going to turn in disappointing numbers because we need to develop this new technology. We need to build a 16K RAM plant. We need to have this technology—we need to invest in Josephson junctions or whatever we're doing." That's a decision that they make based on the assumption that twenty years from now, thirty years from now, there will still be an IBM, but there won't be if they don't make the investments they need.

You have to manage the business. You have to sometimes make Wall Street happy, and sometimes you have to make them unhappy. You have to make your decision, and sometimes, if you're a public company, that means you have to go out and take a lot of heat. But it's better to take the heat up front than it is to take the heat down the road, as surely it is coming if you don't make the investments that are necessary.

On balance, certainly I wish we'd never gone public, looking back on it. It would have given us a lot of freedom, and we didn't fundamentally need to go public. When we made the decision in '85, it was the right decision, because in 1985 we had a company that could run just like a couple of weeks if our sales went to zero. And we expected, within a year, to be competing with IBM, AT&T, ComputerVision, and Intergraph all at the same time. And doing that with no money is kind of a sobering prospect.

So from that context, we really had to do it. The fact that in retrospect we never really needed to is not something that you can undo at this point in time.

I think you do have to ask the question: "Is the environment that you're in the environment that is most conducive to long-term success?" And for Autodesk, we're not really coupled to the US, because substantially more of our sales come from outside the US than come from the US, and I expect that to continue. The US is less than a third of the global economy, and you should not be doing a huge percentage of your sales in the US. And we don't.

We do more business in Europe than the US. Particularly since our CAD business is very closely tied to the manufacturing business, you expect a large part of your revenue to come from those portions of the world where manufacturing is basically done, and that's not the US

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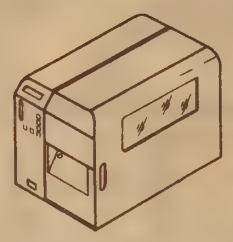

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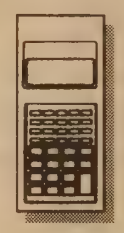

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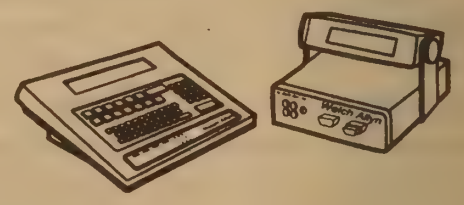

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- ❑ 01 Manufacturing of computer equipment, computers, DP hardware, peripherals
- ❑ 02 Software development
- ❑ 03 Manufacturing
- ❑ 04 Agriculture, mining, construction
- ❑ 05 Transportation
- ❑ 06 Communications
- ❑ 07 Utilities
- ❑ 08 Finance, banking, insurance
- ❑ 09 Real estate
- ❑ 10 Health, medical service
- ❑ 11 Legal
- ❑ 12 Education
- ❑ 13 Data processing, computer service
- ❑ 14 Government
- ❑ 15 Consultant
- ❑ 16 Wholesale/Distributor
- ❑ 17 Research/Development
- ❑ 18 Engineering/Architecture
- ❑ 19 Advertising
- ❑ 20 Sales/Marketing
- ❑ 21 Personnel Placement
- ❑ 22 Entertainment
- ❑ 23 Other

B. Which one category best describes your job title?
- ❑ 01 Owner, Partner, President
- ❑ 02 VP, Gen. Mgr.
- ❑ 03 Marketing Manager
- ❑ 04 Business Manager
- ❑ 05 Sales Manager
- ❑ 06 Project Manager
- ❑ 07 Data Processing Manager
- ❑ 08 MIS Director
- ❑ 09 Systems Analyst
- ❑ 10 Engineer
- ❑ 11 Educator
- ❑ 12 Bus. Microcomputer Specialist

C. How many employees does your company employee?
- ❑ 01 Over 5000
- ❑ 02 2500-4999
- ❑ 03 1000-2499
- ❑ 04 250-999
- ❑ 05 100-249
- ❑ 06 25-99
- ❑ 07 10-24
- ❑ 08 Under 10

D.What department are you in?
- ❑ 01 Accounting
- ❑ 02 Administration Management
- ❑ 03 Communications
- ❑ 04 Data Processing
- ❑ 05 EDP/MIS
- ❑ 06 Education/Training
- ❑ 07 Engineering
- ❑ 08 Finance
- ❑ 09 Marketing
- ❑ 10 Operations
- ❑ 11 Personnel
- ❑ 12 Production/Plant
- ❑ 13 Purchasing
- ❑ 14 Research & Development
- ❑ 15 Sales
- ❑ 16 Other

E. What is your department's estimated budget for computer and computer related peripherals for the next 12 months?
- ❑ 01 Over $500,000
- ❑ 02 250,000 to 499,999
- ❑ 03 100,000 to 249,999
- ❑ 04 50,000 to 99,999
- ❑ 05 25,000 to 49,999
- ❑ 06 10,000 to 24,999
- ❑ 07 Under 10,000

F. Through what channels will your department purchase its 5 computers and peripherals?
- ❑ 01 Computer Retail Store
- ❑ 02 Distributor /Wholesaler
- ❑ 03 Value Added Reseller
- ❑ 04 Consultant
- ❑ 05 Mail Order
- ❑ 06 Manufacturer
- ❑ 07 Other

G. How are you involved in your company's purchasing decisions?
- ❑ 01 I approve purchase
- ❑ 02 I specify product and vendor
- ❑ 03 My opinions influence purchase
- ❑ 04 I do not influence purchasing

H. For how many personal computers do you have this involvement?
- ❑ 01 1 to 5
- ❑ 02 6 to 10
- ❑ 03 11 to 25
- ❑ 04 26 to 50
- ❑ 05 51 to 100
- ❑ 06 100 or more

I. Does your company have personal computers?
❑ 01 Yes ❑ 02 No

IA. Currently Own
IB. Plan to purchase within next 12 months.

IA	IB	
		BRAND NAME COMPUTER
		AT
		286
		386 SX
		386
		486
		COMPATIBLE
		AT
		286
		386 SX
		386
		486
		MACINTOSH
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right now. Certainly Europe or the Far East are the meccas of manufacturing, and I don't see that trend reversing in the near future. So being strong there is very, very important to us.

But I think you also have to constantly reevaluate where you're going to make your investments, where you're going to do things. Up until last year, we did all of our software development in the United States. Now we have a software center in Neuchatel, where I work, and we're moving a substantial amount of our new software development and localization there. I expect before too many years pass we may also have a software development center in the Far East.

Are there qualitative differences between the European and Far Eastern markets, as to who your main customers are?

Yes. The Far East tends to be much more of a very-large-company, very-large-account market, whereas in both Europe and the US we have been selling in a very bottom-up fashion to individuals and small customers. Not that there aren't a tremendous number of individual customers in those markets—it really isn't five big companies running the whole thing. But being in those big companies is much more important, because they tend to set the standards for the people that subcontract for them, and the rest of the economy.

A lot of vendors go into, say, the Japanese market, where there's about twelve different operating systems running on PCs and have a hard time getting past that fact—"Do I write for the NEC, or DOS/V, or AX, or...?"

NEC has 70% of the market. That's a pretty easy decision right there. [*laughs*] NEC is in a stronger position than IBM ever was.

I think—I get nasty after two hours—I think a lot of companies fail because they're arrogant, ignorant American companies that think they can do business in somebody else's culture the way they do business in California. If you go in, and you're trying to sell somebody a word processor, and it doesn't use their character set, you're probably not going to get very far.

Hey, we're just a CAD system vendor, but we got a bunch of guys to sit down and draw eighty thousand characters. If you want to play in Taiwan, particularly, you've got to have traditional Chinese. You've got to have your commands, and the vector fonts that draw on the screen for CAD, and it's a big job. Think about what happens when all those little 256-character tables now have eighty thousand characters in them, and there's a whole disk full of just fonts, right? It's a real mess, but if you want to play the game, you've got to be in it. You can't sell cars with the steering wheels on the wrong side, you know? [*laughs*]

You have to make that investment. Typically the way we organize is that there's a country manager for each country, and that country manager is running the business in that country. They decide which of our products they will sell, what price, what distribution channel, how we do our support—they're the president of a company. Autodesk happens to have a headquarters in Sausalito, but Autodesk is an Italian company, and a French company, and a Russian company, and a Swiss company, because the people in those countries run the Autodesk business there, and they basically make the decisions.

They have to do that. I mean, the thought that you could sit in Sausalito and decide what the price and distribution strategy for Thailand is going to be—it's just crazy. Even if you could do it, it would be ten times harder than having somebody there who speaks the language, who knows the dealers, who visits the customers, who knows who the competition is. Because typically when you go into other countries, you're not competing against three other American companies; you're competing against a whole bunch of indigenous products.

Again, you just have to be sensitive to what people want. The European manufacturer does business in a very different way than a lot of American manufacturers do. And if you want to sell to them, you simply have to solve their problems. ■

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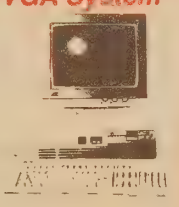

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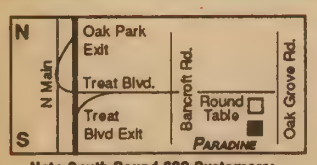

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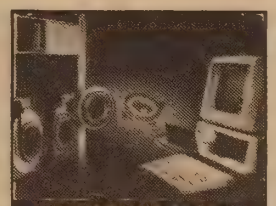

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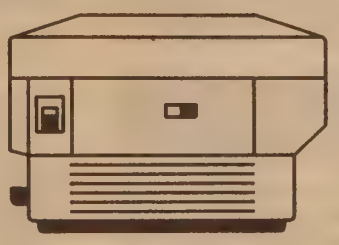

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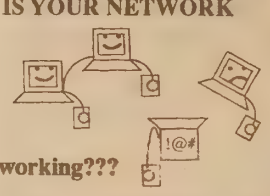

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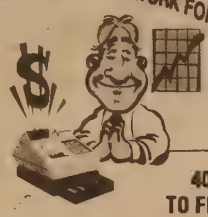

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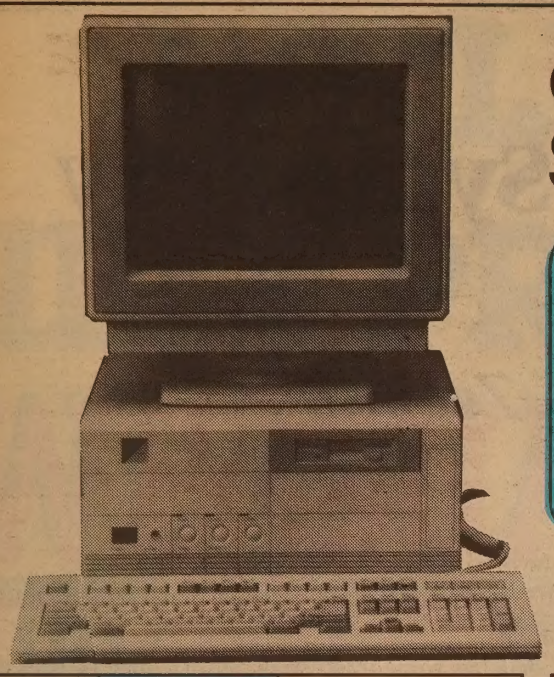

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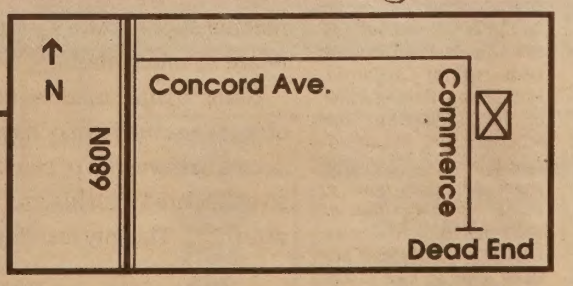

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Bill Gates And No Sympathy For The Devil

Or An Interview With Mr. B. L. Zeebub— Astonishing True Story

BY JOHN C. DVORAK

On April 15, 1992, I was granted an exclusive interview with the master of darkness, Mr. B. L. Zeebub, head honcho of the underworld, sometimes known as "Satan" or "the devil." Since I avoid association with his clan, he contacted me by MCI Mail to set up a meeting. He had learned that I was looking into various industry moguls who are believed to have made a deal with the devil, and that I had become something of an expert on the subject.

Because of an unusual deal he made with Bill Gates, Mr. Zeebub thought it would be good to have a meeting. We chose a neutral spot, the lobby of the San Francisco Marriott, to meet. The conversation was taped, and the following is an edited transcript.

DVORAK: So exactly why did you call for this meeting? I find this unusual.

ZEEBUB: It's quite out of the ordinary for me, too, but I have done quite a few deals with many of the richest men in high technology, and I want to go public with the information.

DVORAK'S LAST COLUMN

DVORAK: Why? What difference does it make?

ZEEBUB: Not wanting to name names, I did a deal with Bill Gates, and it's causing some confusion and consternation with some of the other fellows.

DVORAK: Bill Gates? Don't tell me he sold his soul to become a billionaire?

ZEEBUB: Well, that's what we thought at first.

The deal was pretty straightforward. He's one of the richest men in the world and can have anything he wants. This is, of course, thanks to me. After he's dead I'm supposed to have certain rights that supersede normal procedure. Now we've discovered that this will never happen.

© 1992 by John C. Dvorak. All rights reserved. *John C. Dvorak graduated from the University of California. He is a contributing editor of* PC Magazine *and* MacUser, *and is considered by many to epitomize the contrarian view of things—a charge that he vehemently denies. Dvorak's motto is: If you have nothing nice to say, then don't say anything at all.*

DVORAK: So he sold his soul to be rich?

ZEEBUB: It's not that simple. Gates is too smart for that kind of a deal. He's a tough negotiator. I think the contract is a bit unusual.

DVORAK: For example?

ZEEBUB: Well, his attorneys did a great job—and I admit this—making sure that he's protected from those notorious tricks you've heard so much about.

Gates' people made sure none of that kind of nonsense was allowable. We actually may have been premature when we signed it. He seems to have a lot of clauses my people didn't understand. We were so concerned with his soul that we didn't pay enough attention to his attorneys. The guy just doesn't look that threatening.

DVORAK: Uh, let me get this straight. You did a deal with Gates and the deal favored him?

ZEEBUB: Well, it actually may be worse than that. I'm not sure wha to do about it.

Gates' deal has some interesting performance clauses and som fallback language that they slipped by us. Gates requires that his ne worth increase $10 billion by the end of 1992 and then double eac year for the next five years. It was written in such a way that we didn see how the numbers were going to increase so fast.

My people are having a hell of a time, pardon my French, maintain ing his wealth curve. We got him up to eight billion or so and ca probably meet this year's requirements, but to double it again is goin to be tough.

DVORAK: So throw in the towel. What's the big deal?

ZEEBUB: It turns out that if we don't perform, Gates gets my busines

DVORAK: What do you mean, "gets your business?"

ZEEBUB: Takes over the business. You know, like, owns it.

He gets all those contracts from me. Can you imagine what wi happen when those guys who signed up with me from Su Microsystems, for example, find out that Gates gets their souls!?!?

DVORAK: You mean he'd get their souls? Like for eternity? That kin of thing? What would he do with them? What about when he grows ol and...

ZEEBUB: Oh, he's already immortal. That was another deal he di with an associate long ago. Bill Gates is 208 years old! If I had know about it I wouldn't have done this deal in the first place.

Anyway, I have no idea what he'd do with their souls. Auction them I suppose. It's not them I'm worried about.

DVORAK: Who *are* you worried about?

ZEEBUB: Me. My counselors *now* tell me that if I go into default h will actually own *my* soul.

DVORAK: Wow. First the business, then the soul. How could such thing happen? What would it mean to the scheme of things?

ZEEBUB: That's what we're trying to figure out. My long-term obliga tions to the universe and the good-evil continuum are in jeopardy There's a rumor going around that Gates wants to parcel hell, put i a fake beach and sell condos. It's not that I care that much about th property. It's the principle of the thing.

DVORAK: So what's the point of this meeting?

ZEEBUB: Do you know any good lawyers?

DVORAK: I thought you had them all in hell.

ZEEBUB: They don't keep up with current cases.

Shortly thereafter I left Mr. Zeebub in the Marriott lobby. He looke depressed. I agreed to publish this interview as a plea for an attorney fo the devil. I'm told the attorneys know how to get in touch with him.

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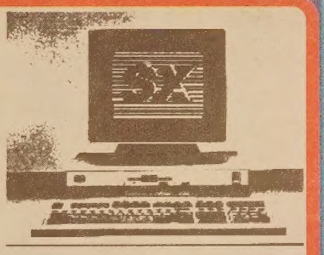

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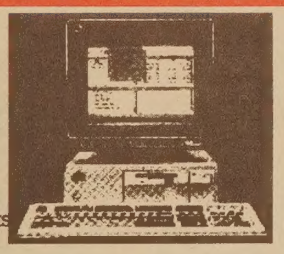

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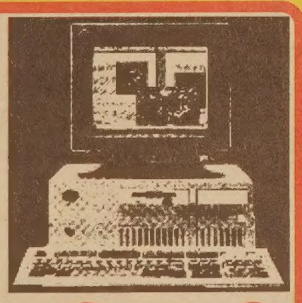

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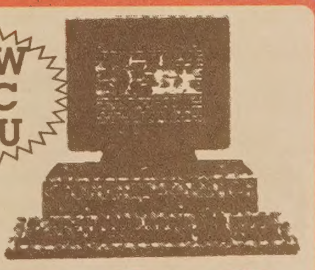

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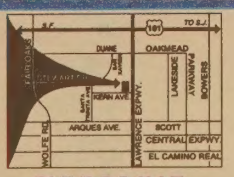

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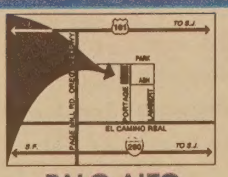

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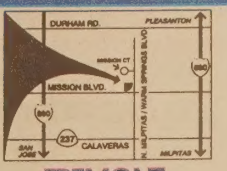

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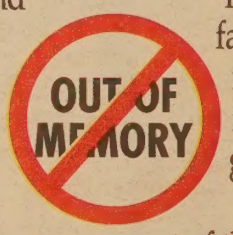

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